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ACCOUNTING
BY
MACHINE METHODS

THE DESIGN AND OPERATION OF MODERN SYSTEMS

By

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PREFACE

Accountants are fully aware of the unmistakable trend from accounting by manual pen methods to accounting by machine methods. Both methods require a knowledge of the fundamental principles, but the latter method requires, in addition, a complete understanding of the mechanical devices involved, and their specific application to individual accounting conditions.

The aim of the authors in this volume is to assist accountants in the proper and effective application of mechanical accounting devices to accounting conditions and to provide them with efficient machine methods that will conform in principle to good accounting practice and yet meet the practical accounting requirements that are found in many classes of business.

The volume is intended to serve accountants as a guide in making accounting machinery installations, from the first preliminary survey to the devising and operating of a complete system of machined records. The best accounting machine is rendered ineffective if applied incorrectly, and practically useless if the accounting routine is improperly organized. One of the major purposes of this book is, therefore, to explain the types of machines available and the characteristics of each according to the work it is especially designed to perform, and to describe the orthodox accounting routine required in order to achieve the best results with each type of machine. The methods described are those which are generally conceded to be the best.

Modern machine methods may be applied to accounting conditions with the same measure of success that such methods have produced in the factory. However, modern business is not as fully alive as it should be to the possibilities of these

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methods, largely because insufficient attention has been devoted to the adaptability and flexibility of the various types of accounting equipment to accounting conditions. With the exception of such literature as has emanated from the manufacturers of accounting machines, no comprehensive and exhaustive presentation of the subject, which at the same time is impartial, has been made, and accordingly, the present volume may be regarded as a pioneer attempt to break altogether new ground in modern constructive accounting.

It is hoped that this volume will serve to extend the use of accounting by machinery, and that the methods it discusses will enable executive and professional accountants, as well as financial officers and company executives, to keep pace with the ever growing demands of modern business for extensive records, quickly prepared and at economical cost.

H. G. S.
H. C. L.

New York,
March 30, 1929.

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ACCOUNTING BY MACHINE METHODS

CHAPTER I

FUNDAMENTALS OF MODERN CONSTRUCTIVE ACCOUNTING METHODS

Demands of Modern Accounting Systems.—The importance of accounting to modern commerce and industry is now almost universally recognized. The tremendous growth of business has resulted in a vast increase in the volume of records and statistics required, and has made necessary the development of a mechanical means, with scientific operative methods, for obtaining mass quantity data with accuracy and dispatch. Just as mechanical means solved industry's earlier need for greater production at a fraction of time required under manual methods, so mechanical means have now afforded the machining of accounting records and necessary paper work of modern commerce and industry.

How Accounting Records and Necessary Paper Work Can Be Machined.—The full value of any installation of mechanical equipment can only be realized through a division of labor whereby all work may be classified and operations logically grouped for machine performance. The establishment of mechanical methods in the factory or office presupposes such a division of labor. The office classification of clerical operations will prove just as effective and beneficial as factory classifications of labor operations have proved to the factory.

In the office an installation of mechanical equipment to accounting and statistical conditions must conform to the general principles of accounting practice, but the sequence of operations or routines must be adapted to the general characteristics of accounting machines described in Chapter II.

However, the equipment should not be selected first and operative accounting methods altered to fit such equipment, but rather it is both necessary and desirable to select equipment most suitable for a given set of accounting or statistical conditions so that minor operative methods may be changed to conform with the mechanical characteristics of the machines adopted.

Fundamentals of Modern Accounting Systems.—In this book descriptions of accounting and statistical methods and routines are presented, showing how the various types of equipment may be generally used. However, it should be remembered by those contemplating the installation of accounting machines that equipment and methods which are left to function unaided are not sufficient to produce the results required under modern scientific operative accounting and statistical conditions. Complete success requires effective organization, sound accounting policies, definite standard practice instructions, and comprehensive classifications of accounts. A few words regarding each one of these factors should prove of value.

What Organization Implies.—Organization implies the control and proper delegation of duties and responsibilities. The division of tasks and operations which mechanical methods of accounting and statistics dictate, necessitates the creation of a sound organization. The executive in charge of accounting and statistical activity must be the pivot to and from whom the mass of media flows in an orderly and systematic manner. Every step in the various processes must be definitely understood by the personnel involved. The accuracy of the data obtained is no greater than the work of the weakest individual in the accounting organization.

Fundamental Policies of Organized Accounting Effort.—One of the fundamental requisites of mechanical methods

applied to accounting and statistical conditions is the establishment of sound accounting and statistical policies. It is well known that poor accounting and statistical policies produce unreliable information, and this applies with equal emphasis to mechanical as well as to manual accounting methods. An accounting or statistical routine policy is a definite course or method adopted for the guidance of those who must act without more than ordinary reasoning, in other words, a uniform method of procedure to secure a desired result under designated conditions. In order that everyone may have rules of procedure by which to guide his work and avoid the mistakes of accounting principle, which may be costly, the accounting executive or practitioner formulates the required policies. Once a policy for an accounting routine is in force, and so long as existing conditions do not change materially, the task of the professional or executive accountant is constantly to refine toward an ideal balance of clerical cost, quality of record, and control.

Importance of Standard Practice Instructions.—The most important purpose and function of modern accounting is to present, in a true, concise, and intelligent manner, the results of the myriad number of transactions which comprise the activities of every active enterprise. If that function is to be properly performed, the transactions must be correctly and uniformly analyzed—which means that all transactions of the same kind must always be handled the same identical way in the accounting routine.

Such uniformity of accounting practice can only be attained economically and efficiently with the aid of written standard practice instructions governing the general and routine methods of accounting as well as the general plan and detailed duties of the organization to which the instructions are to apply. When instructions are comprehensively prepared, they reduce personnel and routine friction, standardize accounting proced-

ure within the organization, and enable the compilation of reliable financial, operating, and statistical data that will afford prompt and effective executive control.

While standard practice instructions may need revision, they should not be tampered with constantly, but should be reviewed periodically and corrected as changing conditions demand. What is applicable to the treatment of an operative accounting condition this year, may next year be less applicable; the year after it may not be applicable at all. If we define operative accounting methods as the art of keeping the records of business in adjustment to conditions and purposes, then this matter of correcting accounting routine policies and formulating new ones as changing conditions bring on the need, is a task of the accounting executive that may be regarded as one of considerable importance.

Planning of Accounting Classifications.—The planning of well-defined classifications of accounts is important if systems of operative accounting are to be statistically efficient and effective for administrative guidance. Since accounts are maintained primarily for use in accounting statements, summaries, and reports by the executives in control of the determination, execution, and direction of policies of business, it must be remembered that to do business successfully over any considerable period of time it is essential that timely information be available in regard to the values and amounts of various types and groups of items resulting from business transactions. The variety of this information will depend upon:

1. The nature and size of the business.
2. The character of the business organization.
3. The degree to which the desire or demand for information has been developed.

Therefore, in judging the fitness of a particular classification of accounts, the end and purpose for which it is planned must

always be the standard by which correct business judgment may be formed.

Some of the important phases of a properly designed classification of accounts are as follows:

1. The classification of accounts as well as the operative accounting procedure and system should directly support all final accounting statements, summaries, and reports that are required in the conduct of a business. The classification assures the preparation and uniformity of such accounting statements, summaries, and reports from period to period, besides being a great aid in effecting proper accounting and statistical control.

2. A well-defined classification gives clearness to the content of accounting statements, summaries, and reports, facilitating their analysis, especially those that have to do with financial, producing, and marketing activities.

3. When a properly designed classification is developed and is accompanied by proper and comprehensive instructions as to its use, it is obvious that when utilized to the fullest extent by an organization which thoroughly understands and recognizes its terms, the classification becomes an effective instrument in the development of accounting statistics that may be used in the conduct of the business.

4. The classification also facilitates the work of operative accounting routine when entries and postings are to be made.

It should be borne in mind that the preparation of comprehensive instructions defining accounts and outlining the manner in which the principles and major details applicable to them are to be treated in operative methods of accounting, is one of the most important duties of the constructive accountant in system installation work.

In large organizations, particularly those doing business at different plants, branches, and offices, a well-defined classification of accounts is the simplest and most effective means of transmitting instructions to the various executives responsible for handling work of accounting content. A classification of accounts with definite instructions for the handling of im-

portant accounts, is just as vital in relatively small organizations, if the accounts are to be handled on a uniform basis from period to period in conformity with good accounting practice.

That properly developed classification of accounts accompanied by comprehensive instructions is the simplest means for developing satisfactory accounting procedure, is a fact that is not always appreciated by those engaged in system installations. It is obvious that once a flexible classification of accounts is developed and installed, the classification can be readily supervised and necessary changes and additions may be made with a minimum of effort.

A proper classification of accounts is the first essential of a good accounting system. Without it there will be much misdirected and wasted effort, numerous errors in classification, discussions and misunderstandings between the accounting department and the operating and administrative departments which study its figures, and unsound and unreliable data for managerial control. The use of mechanical accounting equipment should be borne in mind in connection with the design of a classification of accounts, as by mechanical means comprehensive and exact data can be produced with a minimum of time and effort and expense.

System Surveys and Routine Analysis.—Before the installation of mechanical equipment is contemplated, an intelligent system survey and a thorough analysis of the accounting routine should be undertaken. It is only by a study of this kind that complete and detailed information regarding the accounting routines under observation can be obtained, and the selection of equipment most suitable for the purposes required can be made.

A detailed technical study of an operative accounting routine problem, department, or of the entire accounting and office organization, entails intensive work. A report on exist-

ing conditions with general considerations should be prepared upon completion of the study, and recommendations therein should be followed by the fullest cooperation of the executive personnel in making them effective.

The report referred to should include the following:

1. Organization (including costs)
2. Personnel
3. Methods (including forms and reports)
4. Equipment
5. Standardization
6. Space and layout
7. Illumination
8. Temperature
9. Ventilation
10. Noise
11. Cleanliness

In approaching a clerical and routine study, the following preliminary data should be obtained:

1. Organization chart to be studied. If such a chart is not available, one should be prepared.
2. Routine charts to be studied. If such charts are not available, they should be prepared.
3. Statement of duties of each clerical employee.
4. Geographic chart showing distribution of departments and distances from central or managerial offices.
5. Sketches of all offices showing desk and mechanical accounting equipment layouts, floor space, ceiling heights, windows and doors, etc.
6. Copies of all forms and reports used and compiled.
7. Salary or wage of each clerk for month preceding date of study.
8. Data available in files or elsewhere on organization, personnel, etc., mentioned above that may have a bearing on improvements or may assist in expediting the study.

General Considerations and Factors Involved in System Surveys and Routine Analysis.—Before a detailed technical study can be made, the above data are especially necessary and preliminary thereto. It is only after this preliminary work is concluded that the observer is in a position to develop a tentative forecast as to the results that may be attained. The observer should check up all data received and interview the executives in charge of departments and routines. Each routine and the work performed by each clerk should be taken in turn and thoroughly reviewed; all operations as well as the forms used and reports compiled should be studied.

When a routine or department has been studied, such studies should be thoroughly discussed with the department executive, and then jointly with the executive in general charge. After these conferences are concluded, a complete and comprehensive report including the final results agreed to should be prepared, and any recommendations that may be practicable for future adoption should be included.

One of the greatest needs in connection with office and operative accounting and statistical routine management is the thorough and scientific study of the subject of salary standardization. The losses brought about by lack of knowledge in this regard call for urgent consideration. The work of salary standardization cannot be entrusted to a novice or to an executive whose training and experience are limited in this respect, as it requires much more specialized experience and ability, such as is expected of the specially trained consultant. This phase of the work is thoroughly discussed in a later chapter.

The employment of graphs in connection with peak loads, flow of work, receipts and delivery of media, cost fluctuations, overtime hours, absenteeism, and lateness, should prove of considerable value in the management of operative accounting routines.

Some of the important general considerations of a system

survey and routine analysis to which attention should be directed are as follows:

ORGANIZATION:

1. Organization charts—departmental and general.
2. Distribution and use of charts.
3. Duties specifically outlined and defined.
4. Promotion charts and salary standardization.
5. Office and accounting manuals:
   (a) Manual for the job.
   (b) Manual for the routine.
   (c) Manual for the department.
   (d) Rulings and policies.
6. Meetings:
   (a) Accounting personnel.
   (b) Clerical routine supervisors.
   (c) Departmental executives.
   (d) Committees.
   (e) Special.
   (f) Programs to be made out and distributed in advance.
   (g) Frequency of meetings.
   (h) Minutes—written record of all proceedings and proper distribution and use of same.

PERSONNEL:

1. Individual:
   (a) Personal advancement.
   (b) Incentives.
   (c) Rest periods.
   (d) Male and female clerks—determination if position is suitable, rates of pay, etc.
2. Departmental—talks to accounting personnel by operating heads.
3. Study to determine the time required on all routine operations.
4. Elimination or transfer of unnecessary accounting personnel.
5. Cooperation between clerical and operating forces.
6. Troubles—determine causes outside the office departments which interfere with or retard machine operation.
7. Study general conditions influencing clerical work:
   (a) Light.
   (b) Heat.
   (c) Ventilation.

(d) Noise.
(e) Layout.
(f) Cleanliness.

8. Commotion—elimination of unnecessary commotion due to movements of employees throughout the department.
9. Keeping of clerical production records.
10. Clerical force report daily.
11. Record of employees absent and late and analysis thereof.
12. Vacations, logical arrangement, policy.
13. Clerical costs:
    (a) Monthly.
    (b) Departmental.
    (c) General.
    (d) Analysis of, and discussions at monthly meetings.
    (e) Graphic charts of clerical costs.
    (f) Such costs compared with community wage levels.

EQUIPMENT:

1. Standardization.
2. Special equipment—especially designed for filing contents.
3. Most efficient equipment.
4. Mechanical accounting and other equipment.
5. Desk efficiency:
    (a) Desk inspection.
    (b) Desk arrangement or layout.
    (c) Arrangement of contents.
    (d) Elimination of useless materials from desk.
    (e) Proper type of desk to suit particular work.
6. Removal of obsolete equipment.

PRODUCTION:

1. Development of flow sheets of work.
2. Distribution of flow sheets to members of the department for study, analysis, comment, and suggestions for improvements.
3. Classification of departmental work:
    (a) From other departments.
    (b) Desk to desk, and mechanical accounting equipment.
    (c) Alternating in and out of the department.
4. Job analysis:
    (a) Individual.
    (b) Departmental.

5. Peak loads and overtime:
   (a) Avoidance by proper shifting of personnel.
   (b) Allocation of clerical work.
   (c) Increased efficiency and savings resulting from above.

Forms and Reports:

1. Elimination of useless and improvement of active forms and reports, and economies resulting from a complete study of this subject.
2. Reports—statements, etc., control of, so as to be prepared on dates scheduled.

General:

1. Reduction of special work.
2. Transfer of old records periodically.
3. Economic use of stationery and stationery supplies.
4. Stationery control.
5. Communications and correspondence—accounting department:
   (a) Office letters and memorandums.
   (b) Interdepartmental.
   (c) Letters—standard practice, improvement in letters.
6. Filing—accounting department:
   (a) Centralization.
   (b) Elimination of useless matter from files.

Importance of Classifying Data for System and Routine Examination.—While the character of the information required is limited by the scope of the activities of the particular business, one of the important functions is to classify the necessary data for system inspection for the purpose of revision or criticism. The person making the survey should have fixed in mind a clear mental conception of the system's objective and the essential data that will be required. If the survey is to be systematic and thorough, it is also highly important that a series of questions in regard to the system in use be logically formulated during the course of the survey.

It should be borne in mind that a survey will only disclose the major defects in an accounting condition, and that the actual installation of the proposed operative methods of

the system must detect and locate the numerous inefficiencies which invariably lie beneath present methods.

In any constructive accounting survey the examiner should always be on the alert for possibilities of increasing efficiency in operative routine. Considerations of office heat, light, and ventilation are very important, and impure air in an office due to manufacturing processes has a tendency to make clerical workers dull and listless, with the result that the routine activities lag behind, and less work is performed at a greater expense to the management.

Desirable office illumination varies widely, depending on the conditions in any particular machine installation. Location of certain types of equipment, color scheme of forms, and many other considerations, enter into the illumination question. Machines that are entirely automatic, such as statistical equipment of the tabulating variety, do not require the same foot-candle power as do machines of the descriptive writing and printing type. In general, the foot-candle values range from 6 to 12 foot-candles or lumens per square foot, or an average of 10, where accounting and statistical equipment is to be used. Under certain conditions considerably higher illumination is often desirable where machines cannot be placed at the proper angles due to space conditions.

The examiner should investigate the underlying purpose of each unit in the accounting organization so as to bring each and every activity of the system under proper control. Thus, in inspecting any accounting unit its relation to the preceding and succeeding units, and the methods by which its operations are performed and controlled should be carefully studied. Since the scope of constructive accounting surveys varies greatly, depending on the accounting condition existing, it is only possible to suggest certain normal lines of investigation.

Importance of Constructive Deliberation before Instituting Changes.—It is important that the examiner consider the

active details of his survey, how each modification of routine suggests itself during the course of his inspection, how such modifications in operative methods are going to find a convenient place in the system, and what special modifications are needed to make the system fit the individual requirements of the business under survey.

In determining what is the best system of accounting to meet any business situation, it is quite necessary to consider carefully the importance of the various elements involved; to decide, for instance, whether a limitation of the scope of the information with the resultant decrease in the expense of operating the accounting plan is desirable or not; or whether the benefits to be derived from an increased refinement in the methods will more than offset the delay in and cost of the preparation of information so desired. The system most suitable will invariably be found to be more or less of a compromise, because the law of compensation is the predominating factor. What we gain in one routine we lose in another; what we save by employing incompetent and inaccurate clerks we lose from the errors they make; and what we gain in speed in the compilation of information we must pay for by limitations in its scope.

Business as it is today cannot be administered without the aid of accounting information, and present-day standards require that such accounting data be produced rapidly and economically. Organization, coordination of methods, the use of mechanical accounting equipment, and proper personnel, are the cornerstones upon which the success of the accounting function rests.

CHAPTER II

CHARACTERISTICS OF MECHANICAL ACCOUNTING EQUIPMENT

Mechanical Accounting Equipment Defined.—It is not the province of this book to express preference for particular types of accounting and statistical equipment, but rather to generalize by classes, restricting the discussion to the principles of writing, printing, and horizontal and vertical addition and subtraction of each type of mechanical accounting equipment.

The term "mechanical accounting equipment" does not include so-called auxiliary machines or devices which are used in the performance of ordinary clerical tasks, such as coin changers, payroll denominators, check writing and check protecting machines, time clocks and time recorders, adding machines, calculating machines, etc. Machines of this character are considered as auxiliary clerical aids, but are not a necessary part of the equipment required for the direct machining of accounting and statistical records and for the operation of accounting and statistical functions by mechanical methods. This volume is not concerned with these auxiliary devices, but is confined to the presentation of machines used in bookkeeping, accounting, and statistical recording applications.

There is a great difference in efficiency among the various accounting machines and in the systems to which they are adaptable, for the development of mechanical accounting methods is really in its infancy. It is attempted in this chapter to present some of the important characteristics of various accounting machines so as to enable the reader to obtain a comparable idea of the distinctive features of equipment now in

use. It will be observed in the course of this discussion that some of the stated characteristics are simpler, more rapid, more nearly automatic, and above all, capable of more positive proof than others.

The authors have had full opportunity of testing, under thoroughly practical conditions, the equipment described here, and accordingly are prepared to vouch for them as being suitable for the accounting conditions indicated, as being not merely ingenious ideas, but practical machines capable of performing useful work without skilled attention. The descriptions of the various kinds of equipment are presented in accordance with the following classification, which is based on the characteristics of the equipment:

1. Descriptive Writing Equipment:
   (a) Flat-writing platen and arithmetical features.[1]
   (b) Cylindrical-writing platen and arithmetical features.
2. Printing Equipment:
   (a) Flat-printing platen and arithmetical features.
   (b) Cylindrical-printing platen and arithmetical features.
3. Tabulating and Recording Equipment:
   (a) Punch card method.
   (b) Ticket method.

Descriptive Writing Equipment

Flat-writing Platen.—The unique design and mechanical construction of this type of accounting equipment differs radically from other types, by reason of the construction of its writing surface (platen) which is flat, as distinguished from the round or cylindrical construction of other machines. This outstanding feature enables the machine to handle to great advantage all classes of accounting records.

Machines of the flat-writing platen principle cover such a

[1] Arithmetical features comprise adding, subtracting, and cross-footing mechanisms.

wide range of record writing applications that it is difficult to cover adequately, in this general statement, the scope of their usefulness in mechanical accounting. The equipment represents a unique writing principle, and is the practical combination of a machine and a modern accounting ideal. All the essential factors peculiar to the most exacting modern accounting requirements are conserved in the flat-writing surface principle, so that records of any kind, size, shape, or form can be written to great advantage.

For the purposes of more or less complete explanation of equipment of the flat-writing platen principle, this general description has been subdivided into five distinct characteristics as follows:

1. Writing on cut forms.
2. Writing in bound books.
3. Writing on continuous length forms.
4. Vertical adding and subtracting features.
5. Horizontal and vertical adding and subtracting features.

Writing on Cut Forms.—The outstanding characteristic of the flat-writing platen machine is that it enables the operator to write just as though a piece of paper had been placed on a desk or any other flat-writing surface. It makes possible the rapid and easy handling of all records of any shape, size, or thickness. Rapid and easy insertion may be obtained, and no adjustment in the alignment, either before or after insertion, is required, as the forms are inserted against the straight edge on either the left or right side of the platen, and are firmly gripped by the corresponding rail on that side of the platen. Their position is fixed and there is no possibility of their slipping, creeping, or sliding out of alignment. The removing of forms is just as easy and as simple an operation. On single copy work, 20 to 30 copies of a form can be placed on this type of equipment at one time, making possible the writing of all the forms with but one insertion.

In case certain information is common to several related records of different sizes and shapes, it is possible to collate them rapidly and accurately on the writing surface of the machine and write the entries at one operation, thus eliminating duplication of effort and many of the operations necessary with any other method.

With regard to the loading of carbon paper between forms, it has been found that forms, when not interleaved with carbon paper, are much easier to collate, insert, and align. When inserted, the forms are firmly clamped in position, leaving both hands of the operator free to load the carbon paper between the sheets. The fact that the alignment of the forms is absolutely independent of the carbon paper permits even greater speed, because the carbon sheets can then be slipped into position without the necessity for careful alignment. Removing the carbon paper is a single operation requiring but one pull for all sheets of carbon. This efficient method of handling carbon paper while the forms are held in exact position in the machine, is only possible on the flat-writing platen type of equipment. Since all the carbon sheets can be removed, the ease with which errors can be corrected and erasures made without disturbing the alignment can be readily appreciated.

The flat-writing platen type of equipment also permits the use of carbon paper in roll form which is fed into the machine automatically. This feature eliminates the necessity for handling carbon paper when collating forms. These carbon rolls are made up in approximately 75-foot lengths, and vary in width according to the width of the forms handled. They do not have to be touched when writing or inserting the records. This is one of the features which makes possible the elimination of waste carbon.

The keyboard of this machine is standard, which enables anyone of ordinary intelligence to operate it in a few hours or a few days, depending somewhat upon the character of the work to be done. The machine is equipped with an automatic

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mechanical or electrical shift from one writing position to the other across the form, and in view of the fact that it is not necessary to remove the hands from the keyboard, the operator develops great speed. Single, double, or triple-line spacing, or any writing line position, can be secured. The line spacer can be quickly and easily set to give fixed, positive spacing between ordinary writing lines. Also any depth of writing line can be secured that may be desired by the requirements of any and all classes of loose leaf or card records—ruled or unruled. This type of machine is conceded to be very efficient for manifolding work, due to the flexible construction of the flat-writing platen or surface, the flat, spread-out position of all forms, and the type bar striking directly downward.

All the distinctive features enumerated above naturally tend to bring about greater production in writing on cut forms. Greater production means the elimination of clerks, with resulting payroll savings. Combinations of an endless variety of records written in one operation, which formerly required from one to ten or more separate and distinct operations, or straight manifolding up to 30 copies of the same size or varying sizes, logically increases production. More legible records, requiring a minimum of recopy work added to increased production, is one of the distinctive features of the flat-writing platen principle.

Writing in Bound Books.—In a large number of municipal, state, and federal government offices, records of the bound book variety are now being written by machines based on the flat-writing platen principle, which combines simplicity, ease of operation, labor-saving, and other advantages not heretofore accomplished.

Due to the special mechanical features of this equipment, either side of a bound book page may be conveniently and easily placed on the flat-writing platen of the machine, where it is securely held in position. This makes possible the writing in the

book with equal legibility and perfect registration and alignment throughout, as though the machine were used to write on loose sheets of paper. The powerful downward stroke of the type bar on the page which lies on the hard flat-writing platen is sufficient to force the color pigments of specially inked ribbons into the fabric of the paper, rendering the writing permanently indelible. After the writing has set for a few hours, experiments have proved that it cannot be removed by acid, ink eradicator, or other chemicals, or be effaced with an eraser without destroying the fabric of the paper.

It has been demonstrated over a period of a great many years that records written with inks applied by pen methods will fade, and paper will disintegrate; and that records written by pen methods were slow, costly, and very bulky, requiring at least three times the amount of space necessary for typewritten records. These disadvantages are now eliminated, and the following results are obtainable with the use of this type of equipment:

1. Condensed records, avoiding unnecessary accumulation of bulky books requiring extra storage.
2. Records of desired permanency which, relatively speaking, are impracticable with ordinary inks.
3. Legible, neat, typewritten records, which are in every way superior to pen-written records.
4. A saving of from 65% to 75% of the writing space on each page, permitting three to four times as many records in each volume.
5. Speedier writing of records—at least 65% to 75% faster than pen-and-ink writing.

Writing on Continuous Length Forms.—Machines of the flat-writing platen type that are used in writing on continuous length forms [2] are provided with transverse carbon of great

[2] These forms are classified as fanfolded, tiefolded, interfold and superfolded, which names are used to identify the various styles of forms printed on strips in continuous length, each style having its original and copies of the form set collated in exact registration, one under the other, and then cross-folded for packing into a carton. In the fanfolded and tiefolded style of forms the original and copies are hinged at their

length in roll form. An arrangement which eliminates the necessity for handling carbon when writing and pulling forward the forms, or when changing the carbon writing position, is a feature which makes possible quantity production in billing and order writing applications.

Not only is there an initial saving in the purchase of carbon in roll form, but there is an additional saving through the elimination of waste. The handling of loose sheets of carbon will cause them to crease, fold, and curl, destroying their further usefulness.

All continuous length fanfold and superfold forms are guided from their containers to the cut-off point by a series of adjustable guides, insuring absolute vertical alignment. The flat-writing platen is provided with two clamps which serve a dual purpose in that they guide the forms as they enter the platen as well as hold them firmly in a flat-writing position. Paper clamps hold the forms in position a sufficient length of time after the knife is released to enable the operator to grasp them firmly before drawing forward for cutting and removal.

The transverse carbon holders, which are a part of the machine, will accommodate a considerable number of feet of from two to ten-ply carbon in roll forms. The full roll is inserted in the left holder. The carbon feeds across the flat-writing platen to the right holder, and is drawn tight and held in that position by a turn of thumb screws. The carbon spans the platen in bridge fashion, the platen dropping downward in the rear away from the carbon as the forms are drawn forward. This permits the forms to be drawn in a perfectly straight line. The carbon writing position is easily changed by a mere turn of the right carbon holder. When the entire roll has been

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side edges when delivered, for later separation by automatic form feed machine. The interfold and superfolded style of forms do not have the side edges of forms attached; each strip having but one kind of form, is separate and distinct. There are also single-ply and multi-ply roll forms. In the single-ply roll style of form, one kind of form is made in one single continuous length strip wound on a separate core so that there are as many rolls to the set as there are copies. In the multi-ply roll style of form, the original and copies of the form set are made in separate and distinct strips in continuous length, each strip being superimposed upon the other and wound together on one core, making one large roll for the entire group of forms in sets.

wound on this holder, it can be reversed to utilize every portion of the carbon.

Should it be desired to write single cut forms on the flat-writing platen, it is possible to do so. By removing the continuous length forms and carbon, the machine is converted into a cut form writing unit previously referred to. Forms may be inserted and written as desired and with the same ease as though placing them on a desk. Many copies can be handled as easily as one, and once inserted they are clamped firmly until removed.

On single copy work, by inserting a pack of 25 cut forms on the flat-writing surface of the machine, there can be eliminated 24 insertions, thus making possible decidedly greater production than by means of a cylindrical surface. Another important advantage is that any style, size, or thickness of paper, whether it be the size of an inch square, a large sheet, a heavy card, an envelope, or a letter folder, can be written; all can be handled equally well.

Where roll forms of continuous length are used, a roll form rack is furnished. This rack is of sturdy construction, and is built into the machine to insure stability, thus affording an undisturbed direct feed of the forms regardless of the position of the machine carriage. It will accommodate from one to ten rolls of forms up to 11 inches in width on spindles. Should the forms be less than 11 inches in width, a dividing plate is set into the rack to hold them in proper position, thus insuring absolute vertical registration. Each strip of the set of forms feeds parallel upward through revolving idlers [3] which facilitate their movement through the machine.

In case it is desired to separate forms (fanfold and superfold) in the process of writing, the machine is provided with an effective slitting device. There is a separate slitter for each side fold of the form, enabling mechanical separation of all or

[3] A device used for the purpose of assuring perfect alignment and registration of forms.

any one part as desired. These slitters are compact in their set-up, and are fixed stationary on the carriage of the machine, but may be removed when desired. They function independently of any other unit of equipment, thus insuring rigidity and perfect slitting.

Vertical Adding and Subtracting Features.—All flat-writing platen machines may be obtained with carriage units capable of vertical addition and subtraction in any required number of columns up to twenty-three, depending upon the total amount of addition or subtraction required in any particular column. Adding registers are built in individual detachable units from one cent less than one thousand dollars (999 99) capacity, to a capacity of one cent less than one hundred million dollars (99 999 999 99). Subtraction is accomplished by means of complements facilitated by a special bank of numeral keys provided for in the keyboard. These individual adding registers can be placed on these machines at any time in any desired adding position and removed in a few seconds.

Carriage units capable of vertical addition and subtraction are used extensively for the simpler forms of accounting records which require column additions and subtractions, but no cross-computations and no cross-balancing of figures as in higher classes of accounting records.

There are many classes of simple accounting records to which flat-writing platen machines equipped with vertical addition and subtraction mechanisms can be advantageously applied, such as order writing and billing, check and voucher writing, sales and expense analysis, and other forms of analysis and distribution records; in fact, they can be applied to an endless variety of accounting records, which are ordinarily performed on the typewriter but which require column additions and subtractions of either decimal or quantity figures or both in combination. Where the condensed billing system is desired (unit bill and charge sheet method), the carbon roll features of this

class of equipment are especially desirable, doing away with the necessity for handling loose sheets of carbon. This makes possible greatly increased speed in record writing.

The adding features of this class of equipment offer very practical advantages, such as in billing applications, where it is desired to obtain automatic additions of the various items of each bill, with mechanical and written proof of accuracy, also automatic additions of the total billing or sales for the day or run, with mechanical and written proof of accuracy.

Horizontal and Vertical Adding and Subtracting Features.—Carriage units equipped with detachable registers capable of vertical addition and subtraction and a non-detachable built-in register for horizontal addition and subtraction, may also be obtained on flat-writing platen machines. To attempt to describe even a small part of the various classes of accounting records to which this machine can be applied would make this outline of results that can be accomplished too lengthy. All that can be done at this time is to summarize briefly as follows the composite accounting results that can be produced with the flat-writing platen machine on all classes of accounting records where writing, adding, subtracting, cross-footing, and cross-balancing of figures are required.

1. This equipment furnishes complete written description of all entries, thus eliminating the necessity of all codes and symbols, with consequent checking to assure accuracy; at the same time it provides complete cross-reference to all entries, which facilitates checking and examination of all detailed description of the entries made on the records.

2. It furnishes a complete, chronological, typewritten record of all entries. This is made without extra effort at the same time that the original entries are written, thereby furnishing a complete record and check upon each and every clerical operation, lessening time and effort in "checking back" to locate errors.

3. It furnishes a simplified method of record writing because its extreme flexibility makes it adaptable to the most exacting

present and future accounting requirements of a business. No radical departure from present accounting methods is necessary, yet it effects reductions in cost of accounting operations and furnishes the figures comprising the vital facts of a business. No matter what forms are used in the various accounting processes—whether 2 inches or 2 feet wide—they can be placed upon the flat-writing platen of the machine in a perfectly flat, spread-out position. All kinds of records and forms are handled easily, regardless of the accounting results desired. The operation of the machine is simple; it is equipped with a universal keyboard and all the adding, subtracting, cross-footing, and cross-balancing of figures is automatic. The operation of the machine can be learned easily in a few days if the right kind of accounting control is established over the work of the operator.

4. The machine also furnishes complete typewritten analyses. These analyses are readily obtained from the original entries made by the machine, without the necessity of using any other mechanical device. All detailed entries and figures comprising the required analysis or summary are proved and balanced automatically with the previously established and audited "control" figures; no further verification or checking of individual items is necessary to secure absolute control of accuracy.

5. A characteristic of the flat-writing platen machine is economy of operation. It is so constructed as to eliminate all lost motion and waste in operation, i.e., rapid insertion of forms; automatic registration of forms; no handling of carbon paper; no adjustment of feed mechanism; no adjustment of forms or carbon; accurate tabulation of all columns of figures and descriptions related thereto; no time lost in reloading forms; a high degree of manifolding power, resulting in legibility of all copies of all entries; no waste paper in connection with any forms used; no waste carbon paper; no duplication of work throughout the entire operation; combination of accounting records of the same general class and positive control of accuracy.

6. Another characteristic of the flat-writing platen machine is the feature of accuracy and of control. At the close of each entry there is absolute mechanical and written proof of accuracy of all totals. All daily posting operations are definitely controlled by

complete mechanical proof of accuracy of all entries; and by complete written evidence of correction of any possible errors that may occur during the day or run of work.

Cylindrical-Writing Platen.—Machines based on the cylindrical-writing platen principle, capable of descriptive writing and equipped with horizontal and vertical arithmetical mechanisms, are many in number, and vary greatly in structural design and operating features. Inasmuch as we are more particularly concerned with the general operating characteristics to be found in machines based on the cylindrical-writing principle, rather than with their structural design, model, and make, we have confined our discussion to characteristics based on:

1. Writing on cut forms.
2. Writing on continuous length forms.
3. Vertical adding and subtracting features.
4. Horizontal and vertical adding and subtracting features.

Writing on Cut Forms.—There are various types of machines based on the cylindrical-writing principle which are capable of performing all the descriptive writing features that are to be found in the flat-writing platen machine, with one exception, i.e., the cylindrical-writing platen will not hold a form that is so thick as not to permit curling and proper insertion around the platen. Since the writing on thick forms is a merit feature applying more specifically to the flat-writing platen machine, the authors are of the opinion that such a disadvantage is more of an exception in form writing applications than it is the rule.

Cylindrical platen machines adaptable to the writing on cut forms may be more or less classified by the characteristics of their arithmetical mechanisms, rather than their writing features. For instance, machines in one group are capable of making a complete customer's invoice at one operation, including typing, multiplication, addition, subtraction, figuring of

discount, and handling of fractions, whereas another group of machines are only capable of including in one operation the typing, addition, and subtraction.

Preparation of Bills Only.—Equipment of the first group referred to are an excellent combination of a standard typewriter and complete calculating machine electrically driven with automatic multiplication. Bills can be prepared as rapidly on this type of equipment as they can be copied on an ordinary typewriter, due to the fact that the operator is not required to copy extension or totals, which are printed automatically by the depression of one key.

The operator is not required to exercise extreme care in decimal tabulation, nor in the placing of dollars under dollars and cents under cents, because the machine automatically cares for this essential. A long underscore key, one stroke of which draws the required line above the total of the customer's invoice, is another time saver, and in addition to this, when writing the amount of the invoice, automatic spacing is effected between cents and dollars.

Should it be found necessary to correct an item set up before printing and accumulating in the adding mechanism of the equipment, such items can be entirely eliminated by simply depressing an "error key." When an error of this nature is made on the ordinary typewriter, it is necessary to erase such errors and reposition the carriage.

The electric carriage return and automatic spacing features have a tendency to speed the process of billing, whereas with the ordinary typewriter, the carriage must be returned to the proper writing position by hand.

The calculating mechanism of this equipment discriminates between under and over a half-cent by means of the "full cent key." To illustrate, if the answer in extending a line entry of an invoice should result in 75½ cents, the machine will automatically print 76 cents as the answer. Fractions can also

be handled in either quantity or money values. When unit prices include fractions, the total price is computed mechanically and is automatically extended in the machine.

With these distinctive features, it is natural to expect that billing can be performed on equipment of this type by its single operation method with a greater degree of speed than could ordinarily be attained through the use of a typewriter, because the former requires vastly fewer key depressions than the latter. All totals, differences, and products are printed directly from the figuring mechanism by one depression of the "result key."

Preparation of Bill and Charge Sheet Simultaneously.—The equipment of the second group which is capable of typing addition and subtraction, is usually adopted where cross as well as vertical computations are required. A bill and charge sheet may be prepared in the same writing. Apropos of this, the equipment shows the individual total of each bill, and at the same time accumulates the grand total of the day's billing, serving as a check (predetermined total) against bookkeeping machine postings. If it is desired to have columnar distribution of sales, the machine will accommodate as many columns as are required with the use of wide carriages.

Distinctive Features of Equipment Explained.—Among the operating conveniences of this type of equipment is the automatic electric carriage return, insuring speed of carriage return without metallic shock or impact, which is made possible by the instantaneous pick-up and get-away combined with an air governor and cushion. In spite of the speed which this mechanism provides, it causes less operating strain than a hand return carriage. It returns automatically from any set position or may be returned from any intermediate position by means of the motor bar. The platen is automatically and positively spaced as the carriage returns.

The keyboard arrangement is designed to facilitate the con-

veniences and the highest speed of the operator, and may be equipped with special keyboards to meet every individual requirement. Special characters may be obtained for any specific purpose. The numerical keys are located directly underneath the finger tips of the machine operator and below the space bar. This makes the balance of the keyboard absolutely standard in every respect and results in greater production, because practically every accounting application requires the use of the numerical keys for at least 90% of the work.

The machine operation is facilitated by many distinctive mechanical features which effect time and labor-saving efficiency. The operation of the machine is simplicity itself. The operator may sit in an easy comfortable posture when operating the machine, without the slightest physical strain, affording greater production with little fatigue. The touch of the keyboard arrangement is light and easy, the checks against misoperation removing all mental strain. No complementary figures or mental calculations are required in making corrections.

The latest development in cylindrical platen equipment of the second group referred to above is the "front feed mechanism" with which they are equipped and which provides a maximum of speed and efficiency in the insertion and registration of forms, and makes possible the handling of multiple forms together with a proof sheet or register sheet. The proof sheet is inserted around the cylinder and is spaced automatically, so that it is always in position for the next line of writing regardless of the position in which the entry is to be made on the individual sheet. In posting applications, both a ledger sheet and statement, or other forms, may be inserted in a chute from the front of the machine platen, and the writing position can be quickly found by means of a line finder extending the entire width of the platen. Adjustable end stops are provided for all work where a uniform position on each form

is to be used. Another set of end stops is provided for the insertion of smaller forms, such as checks, vouchers, bills, etc. These latter stops may be used separately or in conjunction with the adjustable end stops referred to. Tests and actual use have demonstrated that this mechanism provides the most rapid handling of paper that has yet been devised on machines of the cylindrical type.

Advantages of the Split Platen.—Equipment of the second group may be obtained with a split platen, which may be split in any position to accommodate the forms used to meet the accounting condition being dealt with. Either section of the platen may be turned independently, or the two sections may be locked together and used as a solid platen. This is used for a large variety of applications. A typical application is that of writing an itemized customer's statement and posting a condensed ledger at one operation. Both forms are inserted at one operation; the ledger sheet is turned into the proper position, and then the statement is brought into position. Only the statement is spaced as the various items are entered while the ledger sheet remains in the posting position. The machine automatically accumulates a total of the items which are posted on the ledger. Another typical application is the writing of a voucher and voucher register at one operation. The register sheet remains in the machine and spaces only a line at a time while vouchers are inserted, written, and removed.

The machine may also be equipped with an automatic visible tally roll or register sheet. This tally does not require the interleaving of carbon. The carbon is carried on a separate roll, and is spaced up with the tally roll or register sheet, but automatically returns to its original position minus a very small fraction of a space. It is possible to make about 100 entries to every inch of carbon that is used. Under average conditions enough carbon may be loaded in the machine to last one month.

Writing on Continuous Length Forms.—Cylindrical-writing platen equipment is obtainable which is equipped with an automatic feed mechanism for fanfold forms, which feeds the machine with fanfold forms from the rear of the machine through its cylindrical platen ready for writing. These forms come in continuous strips, which will be explained in Chapter III. After the first form has been written, the operator simply releases the carriage, swings the form forward, and pulls it to a stop gauge above the platen of the machine. At the right of the automatic feed mechanism there is a lever that controls strip carbon paper. The removal of carbons from the completely written set of forms is accomplished by merely pushing this lever back until it stops. This procedure automatically removes the carbon from the written set of forms and loads the succeeding set of forms with the necessary carbon when those forms are brought into writing position. This operation combines several hand movements into one. The act of pulling the set of forms out to the stop gauge referred to brings the next set of forms into writing position. The cutting knife in front of the platen allows the finished set to be cut off, which enables the operator to proceed with writing the next set of forms.

As many as fifteen legible copies can be made at one operation on this type of equipment. It takes but a few seconds to fill out a complete set of forms, removing carbon paper automatically and bringing a new set of forms into position with carbons in place.

Distinctive Features of Equipment.—The equipment being described can be used without the automatic feed mechanism, and can be equipped with a special bill condenser which permits the writing of successive invoices and sales sheets (as many copies as are required) at one writing. The carbon copies of the invoices appear on the sales sheet in condensed chronological form, the spaces taken up by the printing of the headings of the

bills being eliminated by the pulling of a small ratchet located at the right of the cylindrical platen, which brings the sales sheet to the proper writing line. Distribution columns may be added to the sales sheet for the classification of sales.

Cylindrical platen machines capable of handling continuous length forms, which may be applied to billing and order writing routines, are equipped to meet all quantity and value requirements of accounting conditions, that is, they are capable of handling British money, fractions, tons and hundred-weight, etc. They are equipped with two adding registers, one for adding the items of each bill, and the other for accumulating the total of all bills. In cases where the writing of a sales sheet with columnar distribution is necessary, equipment with more than two registers may be used for adding such columns. The adding of items, the totaling of all bills, and the totaling of the distribution columns are obtained at no further effort than the typing of the bill and extensions.

Vertical Adding and Subtracting Features.—The distinction with regard to the features of vertical addition and subtraction that are to be found in machines of the cylindrical writing principle are the detachable and non-detachable arithmetical mechanisms.

Detachable (Vertical) Arithmetical Mechanisms. Machines that are equipped with detachable arithmetical mechanisms are capable of writing and adding (or subtracting) in one operation when writing a line entry. The detachable units, which are called "totalizers," prove the work being performed at every step of the application to which the machine may be applied with complete visibility of figures at all times.

The number of vertical totals which may be secured at one operation is limited only by the width of the carriage and the required adding capacity of the various columns, as, for example, a totalizer with an adding capacity of one cent less than one hundred thousand dollars (99 999 99) requires a

space nine-tenths of an inch wide. Machines may be equipped with carriages that will accommodate twenty-five (25) of these totalizers on a vertical truck. Each wheel of adding capacity and each space requires one-tenth of an inch, with another tenth of an inch between columns. Totalizers of smaller capacity would increase correspondingly the number of columns on the accounting form to be machined.

This type of equipment may be equipped with an actuator [4] for decimal addition or subtraction in vertical columns, or with what is known as the sterling actuator for the addition and subtraction of English currency as well as other foreign currencies and various weights and measures, such as bushels, yards, feet and inches, dozens and twelfths, pounds and ounces, Indian and Russian currency, weights, etc., in vertical columns only.

These machines are equipped with a "column selector" which makes possible the passing of the machine carriage to the column in which an entry is to be made without stopping in any other column on the form. This feature affords great production in columnar distribution and analysis work of all kinds.

As a check against misoperation, the machine is automatically locked if an error is made in extending the amount or making a columnar distribution. Numerical keys cannot be depressed unless the amount in the cross-totalizer has been picked up and brought into either adding or subtracting positions. Every key stroke must be completed before the next key can be depressed, or before a key will return to its normal position. A key cannot be depressed in the space between dollars and cents or in any other division in the totalizer or between columns.

[4] An actuator is a key which regulates the cross-footing mechanism when adding and subtracting. This key serves to connect the cross-footing mechanism for addition and subtraction when in the zone of an adding or subtracting column. Most actuators when disconnected permit the decimal tripping device (automatic spacer between dollars and cents) to function while in the zone of an adding or subtracting column. Actuators may also be regulated so that the decimal tripping device may be disengaged and not be effective when typing in a column zone.

Corrections are made by the method of direct subtraction. When corrections are to be made, it is necessary to return the carriage to the position where the incorrect figures were written, depress the total key, and rewrite the same amount, printing right over the figure as previously written. This automatically restores vertical totalizers to their original condition and the correction amount may then be written, after having erased or crossed out the incorrect amount.

Non-Detachable (Vertical) Arithmetical Mechanisms. The distinguishing feature of the non-detachable arithmetical mechanism is that it is built in the equipment. There are two types of cylindrical-writing platen equipment having this feature, viz., (1) where 20 numerical keys comprise the complete operation of the arithmetical mechanism, and (2) where 81 or more keys constitute the adding and subtracting mechanism.

In the first type, the figure keys are merely those of the writing unit, while the tabulating keys instantly move the carriage to the exact position in any column of the form whether cents or millions of dollars are to be written. The extreme simplicity of the keyboard affords great flexibility and rapidity of operation.

A motor which operates the arithmetical mechanism also returns the carriage at the end of each line entry automatically, spacing the paper to the next line and writing position. This feature relieves the operator of all heavy, burdensome work, and permits continuous concentrated effort with very slight fatigue.

This equipment functions in such a manner that the numeral keys cannot be depressed when in the position between millions and thousands, thousands and hundreds, and dollars and cents. To illustrate, should the machine operator mistabulate the amount of $534.28, and start writing in the tens of dollars column, the keys automatically lock upon attempting

to write "4." This mechanical guard against mistabulation instantly calls the operator's attention before the item is completed. In the case of errors in typing the right figure, the incorrect figures may be eliminated from the adding mechanism before the writing of the correct amount is completely written. This is accomplished by the mere depression of the elimination key. The adding registers show visible totals at all times. The dials are large and the numerals are clear and easily read.

This type of equipment is also provided with an "indicator," an automatically operated device which indicates to the operator in advance whether the operation which the machine is about to perform is one of addition or of subtraction, and in what colors the figures will be typed.

The second type of non-detachable arithmetical mechanisms is so built into the equipment as to permit of no visibility of figures after being introduced into the machine. The various totals can only be obtained by simultaneously restoring the unit to zero and printing the result. This characteristic is to be found in that type of machine which is a combination of a standard 81-key adding machine (with direct subtraction) and a standard typewriter provided with an electrically controlled carriage affording tabulation to desired writing positions, and which returns automatically.

The only feature provided as a means to check the accuracy of figures introduced into this type of machine is the visibility of the figures represented by the depressed keys before printing. Correction of either the full amount or a single figure may be made before printing.

Horizontal and Vertical Addition and Subtraction.—The distinction between detachable and non-detachable arithmetical mechanisms brought out in the foregoing explanation applies with equal emphasis to horizontal addition and subtraction features of the types of equipment discussed.

Machines that are equipped with detachable vertical arith-

metical mechanisms are also provided with horizontal addition and subtraction, and are capable of performing either function when writing a line entry. The "totalizers" which are used in vertical addition and subtraction cause the automatic functioning of the horizontal arithmetical mechanism which is capable of cross-addition, subtraction, or non-operation, whichever is desired. This addition, subtraction, or non-operation of the horizontal totalizer is controlled by means of cams fastened at the bottom of the vertical totalizers. The adding positions are determined by the position of the vertical totalizers which may be moved to any position on the vertical rack of the machine to conform with the position of the columns on the accounting form set on the platen of the machine.

Any of the vertical totalizers may effect or cause addition, subtraction, or non-operation in the cross-totalizer, which affords complete visibility of figures therein. Any number of columns may be passed without it being necessary to unlock the cross-footing mechanism.

An actuator is provided and connected with the regular numerical keys on the machine, and all addition and subtraction is caused by the depression of these keys, the printing and adding being done at one operation. The principle of this mechanism is of the simplest and most positive because it is a direct gear drive. Mechanical engineers concede that a mechanism operated through a series of levers, cams, and springs, is not as positive and accurate as a gear drive. The gear mechanism also makes possible a minimum of machine parts and the movement of those parts.

Corrections are made by the method of direct subtraction in the vertical totalizers which automatically restores the cross-totalizer to its original condition, and the correct amount may then be written after having erased or crossed out the incorrect amount. No complementary figures or mental calculations are necessary.

Two methods are provided to prove that the cross-totalizers

are clear. One is known as the "lock proof of clearance," which automatically causes all of the numerical keys to lock unless the correct amount is written. This is accomplished without any effort or attention on the part of the machine operator. The other is known as the "star proof of clearance," which is used where a visible proof and symbol are required. The operator depresses the "star key" after having written the last figure. Unless the correct amount is written, this symbol cannot be printed.

Horizontal addition and subtraction may be obtained on machines with built-in (non-detachable) vertical arithmetical mechanisms. Of the two types of cylindrical-writing platen equipment (i.e., 10 and 81 numerical key control) previously described, only the ten numerical key control affords visibility of figures in the cross-addition and subtraction mechanism. The special tabulation stops with which the equipment is provided cause addition and subtraction in vertical registers and also effect the functioning of the horizontal addition and subtraction unit. This machine is also equipped with a key to print a "star" after clearing the horizontal or combined cross-adding and subtracting unit.

Machines provided with a standard typewriter and having an 81 numerical key control are equipped with a built-in accumulator which serves the purpose of a horizontal cross-adding and subtraction unit. The function of this accumulator is governed by adjustable tabulation stops or cams fixed on the carriage of the machine so as to effect plus and minus registrations in the columns of the form to be written on. It restores itself to zero by depression of a "balance key." It does not afford visibility of figures introduced therein, after printing.

Printing Equipment

The Flat-Printing Platen.—The latest development in electrically driven printing equipment designed to meet conditions

in accounting and statistics, that require various kinds of analysis and distribution data in the process of posting is a flat-printing platen type. This machine posts mechanically, balances ledger accounts automatically, and prints all items in clear, legible type, accumulating totals of all amounts posted. It is provided with 20 totalizers and is suitable for the requirements of many and varied accounting conditions.

The unique design and mechanical construction of this equipment differs from other accounting machines in that the construction of its printing surface is flat as distinguished from machines equipped with round or cylindrical-printing surfaces or platens. Each of the 20 totals mentioned above has a capacity of one cent less than one million dollars. The date, as well as all zeros in the amount keys, is printed automatically as postings are made. All printings are made in originals; that is to say, the statement and ledger sheet are printed in duplicate original by means of an automatic repeat printing function. The machine cannot be used where extensive descriptive writing is required, but will symbolize these descriptive data if coded. The descriptive number section of the keyboard allows any posting to be identified by seven numbers or characters, which may be used for invoice number, account number, or other information.

One of the distinctive features of this type of equipment is that it has no platen carriage. The line writing position is obtained by depressing a key controlling the line number of the form to be written upon. This procedure insures perfect arrangement of all data printed upon the form, which at all times is neat in appearance. All records are printed with the same machine set-up and at the same operation which makes it only necessary to prove one record to prove the correctness of the others.

The machine is equipped with automatic registers which classify debits and credits where a total of each class is required to be accumulated. These totals may represent any desired

combination of debit and credit classification, which may be made without extra effort during the operation of posting. Inasmuch as all data are written by one depression of the motor bar key, the writing area is somewhat limited. The platen can handle to best advantage a ledger card measuring 6 by 8⅛ inches, but where statement and ledger are to be posted at one operation, i.e., one printing, the use of carbon is necessary. The number of line entries on forms is limited to 24, although this limitation should not be considered as impairing the flexibility of the machine.

Another distinctive feature of the machine is the complete detailed record of each posting that is automatically prepared on a strip of paper under glass at the base of the keyboard, which is visible to the operator at all times. It serves the purpose of a checking sheet and a permanent chronological record of all postings made during the day. The totals of postings, together with their distribution by classification, and old and new balance summaries, may be obtained by clearing the machine of all figures upon completion of machine operation. These data are printed on the visual checking sheet referred to, which provides a very convenient method of proving the correctness of the work and locating any error that might have been made in the process of posting.

The Cylindrical-Printing Platen.—Machines based on the cylindrical-printing platen principle are many in number, and vary greatly in structural design and operating features. For the purposes of more or less complete explanation, the characteristics of this class of equipment have been divided into two groups, viz., (1) machines provided with an 81 or more numerical key arithmetical control, and (2) machines provided with a 10 numerical key arithmetical control.

Full Keyboard Machines.—Machines applicable to the first group have the following distinctive characteristics:

1. All keys may be easily depressed.

2. Items may be set up in decimal sequence or any order, as may be desired.

3. Two or more keys may be depressed at the same time.

4. The item to be printed is visible when keys are depressed, permitting the operator to check its accuracy before printing and adding.

5. Correction of either the full amount or a single figure may be made before printing.

6. Automatically prints the correct date where desired with each posting.

7. Automatically prints ciphers and punctuation—a remarkable saving in time on the part of the operator, considering the fact that a substantial portion of all commercial figuring is ciphers.

8. Automatically extends the new balance with each posting, giving positive proof of correct posting every day by means of a tally strip.

9. Automatically adds debits and subtracts credits.

10. Automatically selects proper columns for all entries without attention on the part of the operator.

11. Automatically designates totals, sub-totals, subtractions, credit balances, overdrafts and closed accounts, automatically printing symbols that appear on carbons as well as on originals.

12. Automatically prints folios and other descriptive numbers. Repeats folios and descriptive characters if desired.

Many banks have adopted the use of this equipment in the handling of depositors' accounts. Some of the features which this type of equipment affords in routine work of this nature are briefly summarized as follows:

1. A quick, daily proof is obtainable to assure that all amounts are posted.

2. An automatic warning and marking of every overdraft. Whenever an overdraft occurs in an account, the machine automatically refuses to print until one extra stroke is taken. This warns the operator that the amount is overdrawn and makes possible immediate adjustment with the depositor. If an overdraft is

allowed on the account, the machine automatically marks it with a symbol "O. D." in red.

3. An automatic marking of every closed account.

4. A new balance automatically printed in the proper columns.

5. Customers' statements, posted daily, constituting a service to customers and saving the bank's time balancing passbooks at the end of the month.

6. The machine's mechanism automatically shifts the carriage, which brings the various columns into printing position at the right moment; subtracts, checks, and adds deposits automatically; and automatically calculates and prints the new balance of the account.

7. In some cases, particularly in accounts with large manufacturing concerns where a large number of payroll checks are handled, it is often found necessary to batch checks. By depressing a key in the upper left-hand corner of the machine, marked "LST," that designation will print in the check column opposite the amount representing the total of the checks listed.

It is universally conceded that the foregoing automatic features eliminate about 75% of the routine work involved in depositors' accounts, which enables the operators to watch checks and deposit slips particularly and the depression of the proper keys makes possible the assurance that the work is performed accurately, uniform and neat in appearance, and allows a great volume of detail bookkeeping to be done very quickly.

Ten or More Key Control.—The distinctive features of equipment of the second group make it very practical for machine bookkeeping, posting to ledger, making customers' statements, and computing and writing proof of posting at one operation.

Machines of this class have two types of simplified 10-key "touch method" keyboard consisting of two and three banks or rows of keys respectively. These keyboards are so arranged that one hand covers all keys. The fingers have a natural tendency to fall on the keys, and the touch method comes instinc-

tively, which enables the operator to keep his eyes on the work, thus eliminating the constant swinging of head and eyes from data to machine and back again. Eye-strain and mental fatigue are reduced to a minimum.

The operation of the machine is very fast and it can accomplish in a given time more than certain types of posting machines. The keyboard is so simplified that its operation is instantly understood by anyone. Column selection is automatic. To enter an amount, the simple depression of keys in the order ordinarily written on paper with a pencil is accomplished similarly—thousands, hundreds, tens, and units take their proper places without thought on the part of the operator. All postings are immediately before and within easy range of the operator's line of vision.

Advantages of 10-Key Control Machines.—In addition to the keyboard explained, the specifications, features, and outstanding advantages of this equipment are as follows:

1. A proof totalizer is provided so daily postings can be proved.

2. Proof of "old balance" pick-up is automatic, insuring accuracy in the extended balance of the account. The machine subtracts on a tally roll the "old balance" of the account from the new balance as each account is posted, and posts, prints, and accumulates the difference (or the amount posted) for proof. This posting printed on the tally roll serves as a visual check of charge and credit postings if so desired. If the total appearing on this tally roll is not in agreement with a predetermined total established before posting, items appearing thereon can easily be checked against original data.

3. Range of direct vision from eyes of operator to writing platen of machine is approximately 17 inches.

4. All credit balances are automatically printed in red, requiring one stroke of the motor bar, thus reducing to a minimum the possibility of picking credit balances up as debit balances.

5. The return carriage feature is performed electrically, without vibration, and is exceedingly quiet in operation.

6. All machines are provided with form chutes. The ease with which forms can be inserted and the perfect alignment increase speed and accuracy in machine operation.

This type of equipment may be obtained with wide carriages as desired, with or without split cylindrical-writing platen, and has an automatic cross-tabular carrying stop plates which are studded to fit the requirements of the accounting condition to which the machine is applied, and which, when in proper column printing positions, automatically controls the functions of item repeat mechanism, non-addition, direct subtraction, the date repeat, and non-print. The machine is also equipped with functional keys, such as non-add, direct subtraction, multiplication, repeat, and non-print, which are controlled through carriage position. The machine may be operated manually as well as electrically.

One set-up of date and date repeat is all that is required throughout posting, and it is mechanically blocked from printing in columns where it is not required, and can be printed with amounts where required. Special character symbols function similarly, and are especially designed to suit data required in accounting conditions to which the machine is to be applied.

On motor-driven machines, two correction features are provided, whole amount or individual figures. On hand-driven models three correction features are provided, the two mentioned above and an additional one for correction after operating lever has been pulled all the way forward. The carriage position is in easy reach of operation, and in direct line of vision. Apropos of this, a line finder release is also attached to the platen which facilitates the making of line entries, thereby increasing the speed of machine operation. The adding and listing capacity of this type of equipment is one cent less than a million dollars. This type of equipment is small and compact, and the carriage position makes for ease and speed

in inserting forms, as well as in providing the important feature of visibility.

Tabulating and Recording Equipment

Actual performance is the standard by which to judge mechanical equipment used in accounting and statistical conditions that require extensive analytical tabulation and classification recording. There are two distinctive methods of tabulating and recording, i.e., punch card and ticket.

Punch Card Method.—This method functions by three distinct processes, for each of which a separate machine is required:

1. The "punch" unit records full particulars of one transaction upon a card of appropriate size by perforating it with circular holes, the meaning of which depends entirely upon their precise position on the card.
2. The "sorting machine" takes these punched cards and sorts them out into groups, according to data perforations.
3. The "tabulating machine" takes any group of previously sorted cards and summarizes the information therein contained under any desirable number of headings (usually from four to six), and exhibits upon the adding registers the aggregate amounts under these headings of all the cards that have been passed through it since the machine was last reset to zero. In this way it becomes practicable, within a comparatively short space of time to arrive at daily or other periodic totals (which alone need to be dealt with in the books of account proper) of entries under any desired ledger classification. Or if desired, the regular accounting methods may proceed upon quite normal lines, and the tabulating system may be used merely for subsidiary records, e.g., costing, statistical returns, and the like.

Perforating Equipment.—The punching instrument, by the aid of which the cards are perforated, is operated somewhat like a typewriter, but the number of keys being fewer, it can,

of course, be worked much more quickly. Any individual can be taught to operate these punches quickly and accurately within a very short time, and, according to the number of holes that have to be punched the operator may be expected to punch from 250 to 800 cards per hour. The blank card is inserted and punched to the right-hand side of the machine, and travels toward the left as the various columns are operated upon. The object of having one corner cut off the card obliquely is to insure that cards are not inserted in the machines upside down.

By means of the automatic (magazine-feed) key punch machine which may be operated either as an individual unit or connected with a standard descriptive writing or posting machine of the flat or cylindrical-writing platen, cards are simultaneously punched at the same operation by which the bill is being typed, which is one of the latest developments of this type of equipment.

Although this explanation sounds complicated, it is manifest that the punching of the card is not really a complicated process or it could not be performed so rapidly as it is by comparatively unskilled persons. At the same time, it cannot be stated too emphatically that no machine has yet been invented that entirely obviates all risk of the human element. Even a careful operator might occasionally mispunch a card, and a careless or unskilled operator will naturally do so more frequently. The only possible way of avoiding risks of this description—risks equivalent in their effect to making a wrong entry in any commercial record or other book of original entry —is either to "call back" the cards with the tabulation medium which represents the authority for them, or check them by means of a mechanical verifier which is operated in the same manner as the key punch unit. If errors of perforation have been made on a card, the mechanical verifier will lock directly in the column in which the error of perforation was made. In such a case a new card must be prepared.

The calling back should be done from the card to the writ-

ten or typewritten media, and it is preferable that the original operator should not take any part in the process of calling back —an arrangement which is quite simple in cases where three or more operators are employed. However, where two operators are employed and it is impracticable to use some other employee for the purpose, it is desirable that the operator responsible for the card should read from the card to the other operator, who is in charge of the original medium. When properly organized, this work of calling back is not a lengthy process, occupying, in fact, less time than the original punching; but whether lengthy or not, it is essential unless a total check can be established predeterminately.

When whole series of cards relating to similar transactions are being punched, it naturally follows that the punching in a certain number of columns will be identical in all the cards, or at all events in a considerable number thereof. In such cases, it is possible to save a vast amount of time in punching by the use of a modified form of punch, called the "gang-punch."

By the aid of a gang-punch several columns may be perforated simultaneously in a group of cards at a time, thus saving a considerable amount of time in verification afterwards. The gang-punch can be quickly set so as to punch perforations in exactly the required positions, and equally quickly reset for the purposes of the next batch of cards relating to different records.

Whenever a group of, say 50 cards is handled together, it is a good plan to test the accuracy of the record occasionally by seeing whether an instrument similar to a knitting needle will pass through the whole group at one point where one knows there should be a perforation in every card. In this way it is easy to check cards in batches of 50 in order to see whether they were punched so as to show that they contained, for example, no credit entries, and also to see that they were correctly dated, etc.

After the cards have been punched and checked, the next thing is to arrange them in proper order. Thus, cards relating to sales may first of all be sorted out according to the number of the customers' accounts to whom the goods have been sold, and, subsequently, according to the number of the stock accounts relating to the goods sold. For statistical purposes they may also be sorted out in a variety of other ways, with a view to arriving, let us say, by commodity, total quantity, or value of goods sold by any particular salesman, at the quantity and value of goods sold in each particular district, and so on. This merely means that the cards have to be sorted out according to the figures appearing in some particular column (or group of columns) which relates to a particular process of classification.

Sorting Equipment.—The "sorting machine" is driven electrically and uses but little current. The cards are placed vertically upon the table against an upright plate. The pointer is set against the column upon which the sorting process is to take place. It would be beyond the scope of the present work to explain in detail how this marvelous process is actually performed. Suffice it to say that it is possible for an electric current to pass through the circular hole that has been punched in the card, whereas the card acts as an insulator to prevent electric current passing through at any other point in that same column. The current passing through the punched hole operates a magnet, which decides into which receptacle in the lower part of the sorting machine that card is to drop. There are twelve such receptacles, ten for the numbers 0 to 9 respectively, another for cards bearing no punching in this particular column, but especially punched elsewhere to enable them to be skipped deliberately, and yet another for "rejects," i.e., cards which have been included in this sorting group by mistake.

The process of sorting proceeds a column at a time. Thus, let us suppose that we are sorting out cards according to cus-

tomers' numbers which are indicated in columns 42, 43, 44, and 45. The pointer would at first be set at column 45, which would accordingly divide the cards into ten groups, throwing out any cards that might have been included in this process by mistake. The cards will then be taken out of the various receptacles in the lower part of the machine in the order in which they there appear, and replaced upon the table, and the pointer reset at column 44. Similar procedure will be followed until all cards have been sorted out to columns number 42 and 43, by which time all the cards will be in numerical order according to customers' reference numbers. It should be remembered that an enormous number of cards can be handled with this sorting machine in the course of a day by one operator, who need not be a person possessing any mechanical skill, or, indeed, any clerical experience.

After the cards have been sorted and filed, they may be tabulated by means of a tabulating machine at any time to suit the requirements of the work in hand, i.e., daily, weekly, or monthly. In the meantime they will, of course, be accumulating in temporary card holders or trays. It is first necessary to set the machine in order to determine what information has to be tabulated; that is to say, to which columns the process of tabulating shall relate. The machine is provided with six registers with a capacity of one cent less than ten million dollars. For many purposes a very convenient arrangement is to set the tabulator so as to accumulate totals in quantity and value, but it may be pointed out that where accounts are distinguished by number as opposed to name, a very effective check against inadvertently posting to the wrong account is provided by adding up the account numbers and agreeing the total with a corresponding total, taken out independently either upon the tabulating machine, or possibly, upon a comptometer or other adding machine. The needle test referred to will, however, always be quite effective at this stage in insuring

against any confusion in the placing of cards in the temporary card holders.

Tabulating Equipment.—The tabulating machine having been set—a process that is readily performed by inserting at the proper place a "plug" appropriate to the color of the card or otherwise indicated by the nature of the matter to be tabulated—the sorted cards are placed vertically on the table of the tabulating machine against an upright plate, on the upper left-hand side of the machine. The machine is then started, and proceeds to tabulate the results which are shown on the registers.

The figures shown by these registers can be taken down either by hand or automatically printed by the machine. If taken down by hand, it should be known what precise meaning to attach to them in every case. In either case, however, they will form the basis of subsequent entries (in totals) in the books of original entry, but of course, only after these totals have been brought into agreement with a corresponding series of totals arrived at from the same cards, after they have first been sorted according to specific classifications or reference data. In this way the number of actual postings to the summaries can be reduced to one posting per account per day, per week, or per month, as may be found expedient, an arrangement which eliminates an enormous amount of clerical work that would be involved in any other process of tabulation with the use of machinery.

A complete installation, consisting, let us say, of three punches, one verifier, one sorter, and one tabulator, would involve the employment of 4 operators, none of whom need be skilled. The equipment alone will occupy very little floor space, and so far as office accommodations are concerned, in a floor space suitable for six clerks one can set up an installation capable, as far as work is concerned, of keeping pace with a clerical staff of fifteen working under pen methods. In addi-

tion to normal accounting uses the tabulated record, being in an exceedingly flexible form, may be used for providing all sorts of statistical data as and when required, with absolute accuracy and with only slight additional expense.

Variety of Uses.—The classes of work for which these types of equipment are suitable depend largely upon the volume of data to be handled. There is absolutely no class of statistical accounting classification work to which they are unsuitable; but their adoption by a very small concern with comparatively infrequent transactions might well be regarded as economically wasteful. However, it should be emphasized that all classes of transactions that are at all frequent cannot necessarily be recorded upon these machines with great advantage. To the reader who perhaps has not yet fully grasped its possibilities, a few suggestions can hardly fail to be helpful. The need for some such device first occurred to Dr. Herman Hollerith during the United States Census of 1880, with the result that the Hollerith system, as it then existed, was used in tabulating the U. S. Census of 1890. It was employed with great success in Great Britain in the compilation of statistics for the National Registration Act of 1915 in connection with certain districts. As instances of its utility more directly connected with ordinary practical business statistics may be mentioned, in particular, records connected with manufacturing costs; wage analysis; sales analysis; storekeeping; records of individual efficiency; plant records; records of the work performed by individual machines in manufacturing works; fire, life, and general insurance accounts; statistics and valuations; statistics concerning employees; hospital statistics; railway operating statistics; and a host of other similar purposes. The practical working of these machines is simplicity itself, requiring no special skill whatever, but merely a reasonable, natural orderliness of habit.

Some Objections Answered.—The idea of punching each separate transaction upon a distinct card may—and very likely

will—suggest to many readers the idea of an enormous accumulation of cards occupying much valuable space. In this connection it may be pointed out: (1) that under this system the single card takes the place of numerous intermediate records, which if accumulated would in all probability be found to occupy quite as much cubic space; (2) that so far at least as space in the actual office is concerned, a very important economy can be quickly effected by punching the combined results of a whole series of similar cards—several hundred in number—upon a summary card of distinctive color, thus enabling a corresponding number of old cards to be stored away in reserve.

This method of tabulating and recording is especially valuable, not only on account of the economy that it can effect in the matter of office space and clerical salaries, but also because of the extraordinary speed with which results can be accomplished, thus enabling useful information to be obtained on short notice, and because of its remarkable facility to record every conceivable kind of transaction from every possible angle from which it could be regarded.

Under the tabulating and recording system described, each card when punched records all the necessary facts connected with a single transaction. When these have been marshalled upon the double entry basis, they are still available in their entirety to be remarshalled upon any other basis that may be found convenient, either at the time or at any subsequent stage, provided they have not been destroyed in the meantime.

Combined Alphabetical and Numerical Tabulating Equipment.—The most recent development in the punch card method is the combined alphabetical and numerical tabulation machine. The alphabetical punch, in addition to punching numerals on standard tabulating cards, automatically perforates holes representing any letter in the alphabet, and makes coding unnecessary. This punch is electrically driven with automatic card injection, enabling multiple punching in any or all columns.

It is equipped with a standard typewriter keyboard for both alphabetical and numerical punching, with electric automatic carriage return, which is performed immediately upon completion of the entire card. There are many distinctive features in this type of punch, among which are the adjustable field skip bar, correction without card spoilage, and the fact that all or any part of data once set up may be retained in punch until changed by the next set-up.

The tabulator is also electrically driven, and is equipped with a standard typewriter carriage which affords single and double spacing. The results of the perforated cards are tabulated automatically on forms or continuous rolls of paper. This type of tabulator prints and adds from the eleventh and twelfth positions on the cards and from two or more positions in the same column, besides printing grand totals in the respective columns. It has a continuous card feed, a large receiving magazine, and a connection box which result in maximum card capacity, minimum machine changing time, accuracy, and uniformity.

The tabulating and recording method is one of the major developments in the compilation of statistical and specialized accounting data where volume is a factor. It aims at a really adequate record of transactions from every important point of view, made systematically, accurately, economically, and above all, with the greatest speed.

Ticket Method.—Machines of the ticket producing type save time, labor, and expense in providing accounting data and adequate statistics that often entail considerable expense the non-mechanical way. These machines automatically issue tickets on all operations, on any class of applications, or whenever desired. This ticket may be prepared with or without stub attached, whenever the operator chooses. The extent of the information printed on both parts of the ticket is the date, serial number, identifying numbers, symbols for the totals

used, and the amount. The ticket may be used as a voucher, pay ticket, requisition, posting medium, for filing purposes, and in many other ways.

This type of equipment is adaptable to all kinds of analysis and distribution work, such as: sales analysis; payroll; cost or expense distribution; purchase analysis; distribution of remittances received; stock and production control; and many other similar accounting conditions. Its flexibility has made possible the development of many new methods in work of this character which have resulted in greater speed, accuracy, and economy in operative accounting.

Distinctive Features of Equipment Explained.—The large number of totals with which these machines are provided eliminates the necessity of hand sorting of the records from which the information is taken. The machine is driven electrically, and the mechanical addition of all amounts, together with the legible printed records prepared by the machine, naturally results in rapid and efficient operation.

They are equipped with 27 unit registers that have a capacity of one cent less than one million dollars, and three total registers that have a capacity of one cent less than ten million dollars. On standard equipment each total register controls nine unit registers, and additions may be upon one, two, or three total registers at one operation. Each of the unit registers is controlled by a single key, representing whatever classification the accounting condition requires. They may be used for different purposes on specific accounting conditions. This feature is made easy by merely removing index plates containing the code of the classification as used in one accounting condition and applying new index plates applicable to another. Distinctive symbols for each total identify what has been done. The number and arrangement of the totals and the symbols may be varied to meet the requirements of the accounting condition to which the machine is to be applied.

A complete tally of the media handled during the process of machine operation can be obtained through the use of separate counters which are provided to show the number of items recorded on each total. This permits the securing of averages for the various classifications of sales, costs, purchases, or whatever the various totals represent.

These machines will automatically print sub-totals or clearing totals. When printing sub-totals, the amounts in the machine remain unchanged. When clearing totals are printed, the adding registers are automatically cleared and restored to zero.

It is important to emphasize that these machines are not descriptive writing units, but are equipped with a number-printer which prints descriptive numbers or symbols which may be used to identify each transaction. Ten characters may be printed. This feature, however, may be used for recording account numbers, folios, lot numbers, invoice numbers, stock numbers, employees' numbers, part numbers, etc.

At the base of the keyboard a visual checking sheet in continuous roll form contains a detailed record of each transaction, which gives the operator a visible proof of operation of the preceding 34 transactions tabulated by the machine. A serial number is automatically printed simultaneously on the checking sheet and on a ticket or any other form, invoices, requisitions, remittances, checks, etc., when the latter are inserted on the flat-printing platen. Any item may be traced by means of this serial number. This feature also furnishes at any time the total number of transactions handled.

Sitting Posture of Operator

The successful operation of the equipment discussed in the foregoing pages depends to a certain extent upon the operator's posture during machine operation. The avoidance of undue muscular strain and fatigue by habitual good sitting postures, and by change of posture, are very important factors. When

the installation of mechanical accounting equipment is contemplated, very little thought is usually given the question of the type of chair that will encourage good posture and be comfortable for the operator. The principle aim of most accounting executives seems to be to obtain a chair that is unbreakable, rather than one that is correct from an anatomical standpoint. It is a customary practice to select for the machine operator one of the regular chairs in the office where the equipment is to be used, without it being realized that none of the ordinary chairs are suitable seats for the accounting machine operator.

A good operator's chair is one that conforms to the structure of the body in a seated position, giving maximum comfort to the occupant and at the same time eliminating physical fatigue and muscular strain. It may be pointed out that as all machine operators are not made in the same physical mold, the chair should be adjustable in regard to the height of its seat and back rest. The chair should revolve and have casters as an added convenience, so as to make it possible to shift it from one position to another, whether the distance be great or small. The heights of certain types of mechanical accounting equipment vary in a very great degree, so that particular regard must be given to the height and depth of chairs, the seats of which should be broad, not too deep, and slightly saddle-shaped, with the front edge rounded. Observable experience has disclosed that the front edge of a machine operator's chair is often a source of much trouble, especially if it extends too far under the knees, cutting off circulation. Chairs equipped with wood seats have been found most adaptable, because such material as leather or cane has a tendency to become saggy, and metal seats are too hard, or are often built with sharp edges which cut off circulation.

The type of chair back universally considered desirable depends again on the type of mechanical accounting equipment that is to be used. When constant shifting or reaching is involved during machine operation, the chair back, unless care-

fully constructed, has a tendency to interfere with arm movements. The back support should be properly shaped and adjustable and placed at the right level—approximately 7 inches from upper surface of the seat so that the operator may sit well back. Care should be taken that support be given at the small of the back, and that this support be at least 3 inches wide and slightly curved. Supports with sharp edges should be avoided. Where horizontal supports are adopted, they should be so spaced as to avoid pinching the operator as a result of being too narrow, or prevent the necessary space needed at the base of the chair by being too wide. In view of these conditions, which are based on the specifications of scientific posture, it can be readily appreciated why most office seating equipment is fatiguing.

The whole matter of posture in relation to the functional activity of routines where mechanical equipment is employed, is much more complex than is ordinarily appreciated, and too much emphasis cannot be laid on the great importance of correct posture, particularly where mechanical equipment is used in accounting and statistical applications.

CHAPTER III

ACCOUNTING MACHINE FORM ANALYSIS AND DESIGN

Rules for Form Design.—The designing of forms so as to provide for ease and economy of use is a consideration of primary importance—one which has a vital bearing on the efficiency with which forms can be prepared with the mechanical accounting equipment described in the previous chapter. No matter for what use the form may be intended, careful adherence to the following rules will insure its design so as to carry out its functions most effectively.

1. Before attempting to design any form, clearly define the purpose for which that form is intended.

2. Carefully list all the information which the form must record in order to fulfill its purpose.

3. Establish the proper sequence of this information so that the most desirable positions can be assigned to important elements and all arranged for ease of recording or reference.

4. Determine the amount of space necessary for the proper entry of information and decide on headings, type, sizes, and faces so as to emphasize important points properly.

5. Investigate forms serving similar or related purposes and endeavor to combine forms whenever possible, so that by making a number of copies at one writing one form will serve several purposes.

6. Determine the most satisfactory size that will take care of the required information to the best advantage on the accounting machine adopted.

7. Consider the grade of paper that will insure permanency of record, satisfactorily withstand usage, clearly record impressions, and present a creditable appearance.

8. Incorporate on the face of each form brief instructions showing its proper use.

9. Give attention to the balance and general appearance of the form, especially those for external use.

10. As much information as possible should be aligned so as to permit straight left-to-right writing, thus preventing excessive changing of the vertical position where machine is to be used.

11. Where forms are to be written exclusively by machine, horizontal rulings should be eliminated and vertical rulings reduced to a minimum.

12. All forms to be mailed should be designed for use in a window envelope so as to eliminate addressing.

The accompanying analysis is developed for the purpose of facilitating work in analyzing forms, and should prove helpful to those engaged in constructive accounting work as an aid in carrying out the above rules.

It should be borne in mind that the reason forms are used is because of necessity and desirability, and either of these reasons should be sufficient cause for devoting considerable time to their design. Serious consideration should be given to the procedure controlling all forms, for while forms may be perfect in design, they will lose their effectiveness if the routine within which they are to serve is strewn with hindrances.

Advantages of Standard Invoice.—The confusion in size, form, and typographical treatment of an invoice, with its lack of uniformity in the arrangement of its items, and the obliteration caused by the use of rubber stamps and riders, is one of the business wastes that should be eliminated by the united action of all industry through the adoption of some type of unification and standardization of invoice design. Such a standard invoice will eliminate the waste in clerical effort now necessary on the part of the customer when checking and approving invoices for payment. It is a well-known fact that invoices of varied sizes, with date, order number, and other

Standard Practice Instructions for Form Analysis

Name of Form..... Survey by.....

Number..... Date of Survey.....

I—Purpose of Form

1. Obtain a full set of forms if more than one is used, and have complete sample entries made thereon.
2. Describe the main purpose of form.

.....

.....

.....

.....

3. Describe other purposes, if any.

.....

.....

.....

.....

.....

4. Are purpose or purposes effectively carried out?
5. Are other forms used for the same or similar purpose? If so, name them.
6. Attach to this analysis a copy of form used for the same or similar purpose with complete sample entries.
7. If preparation of both forms causes a duplication of work, describe fully.
8. Ascertain the approximate yearly cost to obtain information on the form which is the main subject of this survey.
9. Does the use to which the information is applicable warrant the cost of preparation?
10. Present other comments and suggestions regarding purpose and use of form.

.....

.....

II—Detailed Description

Show in space provided the type of form as follows: *A—Cut Forms* *B—Loose-Leaf* *C—Cards* *D—Other (describe)*	Original	Type of Form	Copies			
1. Size						
2. Quality of Paper						
3. Weight of Paper						
4. Color of Paper						
5. Color of Ink						
6. Ruled Lines						
7. Printed Lines						
8. Does spacing conform to machine?						
Horizontally						
Vertically						
9. If not, what is the distance between lines?						
10. Number of Columns						
Width of Each						
Width of Each						
Width of Each						
Width of Each						
11. Perforated						
12. Punched						
13. Printed						
14. Lithographed						
15. Mimeographed						
16. If made otherwise, name process						
For Binding Purposes:						
Flat						
Folded						
Rolled						
Post Binder						
Ring Binder						
Stapled Bound						
Other Binding Means						
For Filing Purposes:						
Current File Cabinets						
Transfer File Cabinets						
Shelves or Racks						
Desks						
Safes or Vaults						
Other Containers						
Other Places for Safe Keeping						

III—Preparation and Disposition

1. Number of copies prepared.....
2. How prepared—Hand-written: Pen: Pencil:
3. If by machine, state: Name.....
   Model.....
   Type.....
4. If prepared otherwise, state method or process.....
5. How distributed, to whom, individual and department name:.....
   Original.....
   Copies .....
   .....
   .....
   .....
   .....
   .....
6. Purpose for which distribution is intended:.....
   Original.....
   Copies .....
   .....
   .....
   .....
   .....
   .....
   .....
7. Determine if forms are to be used:.....
   (a) As an active working record.....(b) Read for information.....
   (c) Filed.....(d) Destroyed.....
   (e) Returned.....(f) Or other disposition.....
   Original.....
   Copies .....
   .....
   .....
   .....
   .....

IV—Effectiveness of Form

Form Data:

1. Describe source of information which is entered on form.
2. How is information received for entry?
3. Is there a more economical or better method of obtaining the information?
4. If so, explain.
5. Is all the information shown on form?

V—Analysis of Possible Economies

1. Would it be desirable to make two or more copies in one operation?
2. Would it be desirable to use carbon in continuous form instead of sheet carbons?
3. Can entries be dispensed with or abbreviated?
4. Can writing be reduced by use of check marks or symbols?
5. Is it desirable to adopt horizontal or vertical spacing for typewriter or accounting machine use?
6. Could the data or sequence of items be rearranged?
7. Could entries be made more legibly if more space was provided for items that required it?
8. Would the use of rubber stamps be considered, and would their use be desirable?
9. Are the forms handled in the best possible manner as far as time and results are concerned?
10. Is reduction in size of forms practicable?
11. Would it be desirable to cheapen the quality of paper?
12. Would standardization of size of forms be of advantage for filing purposes?
13. Could the thickness of paper be reduced without altering the practical use of the form?
14. Could savings of space be effected by changes in methods of binding or filing?
15. Could copies for unimportant purposes be eliminated?
16. Describe the possible economies in detail on separate sheet.
17. Present other comments and suggestions in regard to improving the form or the routine to which it is applied.

data scattered in different places over each, present a condition of confusion rather than order in invoice checking routines where large quantities of invoices are handled. As the checking function in such cases becomes wasted effort, it would seem that the standardization of invoices in size, form, terminology, and typographical appearance should be regarded as a matter of considerable importance.

Yet this condition of wasted effort due to inefficient invoice design, preparation, and audit continues unchecked throughout industry. As a means of saving a substantial amount of clerical effort employed in the preparation of the invoice and its audit by the customer, the attention of the reader is directed to the illustration of the uniform invoice in Figure 1, recommended for general standardization and use because of its evident economies. This is a very excellent form of invoice that deserves encouragement for universal adoption.

Instead of a multiplicity of ill-sorted invoices of varied sizes and shapes, which are costly to prepare and even more costly to check, the adoption of an invoice similar to the form illustrated will be of mutual advantage to both buyer and seller. The form shown would necessitate certain changes to suit individual business requirements in so far as the column headings are concerned, although the upper section of the form would seem to be indispensable for every business.

It will be noted that the centralization of all necessary information and its placement favors all billing equipment and simplifies the operation of writing to the irreducible minimum. Reference is made to the definite space reserved for customer's use—a space clear of any other information, a space for any data the customer may wish to affix in accordance with the methods adopted by such a customer for checking and approving for payment.

Other advantages of this form of invoice include the following. A maximum degree of speed and accuracy may be

effected in preparation, since it centralizes all shipping data and gives a continuous writing position with natural machine carriage shifts. It gives a fixed column for the customer's

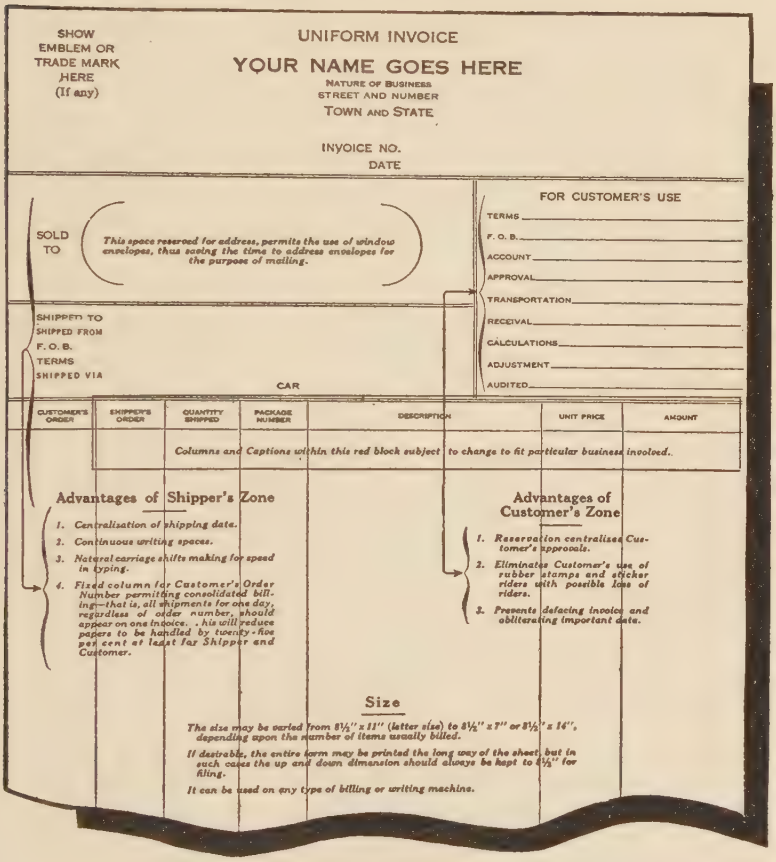

SHOW EMBLEM OR TRADE MARK HERE (If any)
UNIFORM INVOICE
YOUR NAME GOES HERE
NATURE OF BUSINESS
STREET AND NUMBER
TOWN AND STATE
INVOICE NO.
DATE
SOLD TO
This space reserved for address, permits the use of window envelopes, thus saving the time to address envelopes for the purpose of mailing.
FOR CUSTOMER'S USE
TERMS
F. O. B.
ACCOUNT
APPROVAL
TRANSPORTATION
RECEIVAL
CALCULATIONS
ADJUSTMENT
AUDITED
SHIPPED TO
SHIPPED FROM
F. O. B.
TERMS
SHIPPED VIA
CAR
CUSTOMER'S ORDER
SHIPPER'S ORDER
QUANTITY SHIPPED
PACKAGE NUMBER
DESCRIPTION
UNIT PRICE
AMOUNT
Columns and Captions within this red block subject to change to fit particular business involved.
Advantages of Shipper's Zone
1. Centralization of shipping date.
2. Continuous writing spaces.
3. Natural carriage shifts making for speed in typing.
4. Fixed column for Customer's Order Number permitting consolidated billing—that is, all shipments for one day, regardless of order number, should appear on one invoice. . his will reduce papers to be handled by twenty-five per cent at least for Shipper and Customer.
Advantages of Customer's Zone
1. Reservation centralizes Customer's approvals.
2. Eliminates Customer's use of rubber stamps and sticker riders with possible loss of riders.
3. Prevents defacing invoice and obliterating important data.
Size
The size may be varied from 8½" x 11" (letter size) to 8½" x 7" or 8½" x 14", depending upon the number of items usually billed.
If desirable, the entire form may be printed the long way of the sheet, but in such cases the up and down dimension should always be kept to 8½" for filing.
It can be used on any type of billing or writing machine.

Figure 1. Uniform Invoice

order number, permitting a consolidated billing operation. A space is also provided for the name and address in such a manner as to permit the use of a window envelope, thus saving the time and effort of addressing envelopes. It will be also noted that ample room is provided for the comparatively

small latitude in terminology required through change in column headings.

In every business, regardless of size, there are a great many forms, i.e., orders, bills, requisitions, etc., which could be handled by improved types of record writing equipment. Copies of some of these records, in varying numbers, are indispensable. Under ordinary typewriter methods each added copy of these miscellaneous forms results in more work, increased cost, less production or less accuracy, whereas with the improved record writing machine such work can be performed by using forms in continuous lengths with practically no additional effort or cost.

The Continuous Form Explained.—In order that a better understanding may be had of what is meant by a "continuous" form, a brief history of its practical machine application is presented. Realizing the advantages of handling continuous forms in preference to separate sheets, the designers and builders of writing machines experimented with the writing of forms in continuous lengths by loading as many as ten rolls on a rack at the rear of the machine, each roll containing a single strip of forms wound to a diameter of 4 inches. These strips were fed across the writing surface of the machine from the back forward, one on top of the other, in such a manner that strips of carbon paper could be interleaved and clamped securely on the sides of the writing surface of the machine. This experiment brought about a continuous stream of paper fed into the writing machine, with attachments, making it possible to obtain an original writing and nine clear and distinct copies. The development of this type of equipment stopped, and for a number of years no further progress was made.

Many minds worked on the problem of overcoming the evident disadvantages of the roll form, such as curling, lack of proper alignment and registration, and the varying number of single forms on a roll, which latter disadvantage may be con-

sidered merely a technical one, though very real. As a result of these efforts the fanfold form was introduced about twenty years ago. In the development of this type of continuous length form, with a width equal to the combined widths of all the forms required, printed on alternate sides at one time on one press, and folded zigzag, the various parts, one under the other in perfect registration, a new problem was encountered. It was found absolutely impracticable to roll these zigzag folded forms on a spool because the outside strip or parts of a set of forms had a greater circumference to travel than the inside or lower parts. This was overcome by taking the zigzag folded sheet of paper and fanfolding it back and forth into a carton or container.

The interleaving of these forms with carbon paper presented the builders of writing machines with another problem that had to be overcome, and after much experimentation they succeeded in fastening the carbon paper on fingers which projected into the zigzag openings of the forms from the rear of the writing surface of the machine. Without going into detail in regard to the mechanics of the various machines that are capable of assimilating this type of form, it may be stated that fanfold forms have been regarded as one of the best, most economical, and most practical continuous record writing media that have ever been developed by reason of the fact that they afford a greater variety of uses.

There are, however, objections against fanfold forms, but such objections are not as serious as against the rolls; nevertheless, they are important. It was found that the time saved in writing was usually lost in changing carbon paper from the carbon fingers, making a disagreeable and smudgy function for the machine operator. The separating of the various forms, together with the accompanying ragged sides was also found objectionable, which led to further experiment and which resulted in a more practical continuous form, styled the "superfold."

The unbroken chain of the superfold form, consisting of as many as ten strips fed into the machine in perfect registration, and coming from the writing surface with clean-cut edge, written with a clear type, all copies distinct and legible, is one of the latest contributions that has been made toward the perfection of the machining of records for order writing and billing applications. Together with this perfect combination of forms, the machine may be loaded at one time with enough carbon paper interleaved between the various parts of the forms to last throughout the complete writing of the several thousand sets originally set up at one time at the rear of the machine.

Picture 5,000 sets of four parts (quadruplicate) superfold forms threaded into the machine at the rear, together with enough carbon paper to take care of the entire 5,000 sets of forms, feeding across the writing surface of the machine, both forms and carbon paper loaded into the machine at one time. It means just this: At the rate of using 250 sets of forms per day, the machine operator has to change her carbon paper only once every 16 days. If it were possible to write that many sets a day using single cut forms, the operator would be required to handle 3 times 250, or 750 sheets of carbon a day. In addition the operator would have to gather and interleave 1,000 sets of paper. In contrast to this old and wasteful method of handling forms, a four-second operation two or three times a day to change the carbon writing positions is all that is necessary now. It has heretofore required from 20% to 60% of an operator's time to make preparations to write a set of forms on the ordinary typewriter, but this lost motion is now entirely eliminated with the automatic feed machine and superfold forms.

Looking from all angles at this phase of the subject, it must be admitted that billing, order and record writing are not so much a speed-writing operation as they are a paper-handling problem. If that is considered one of the predominating factors, then the problem may be answered by a combination of

machine and forms which will take away from the operator most of this handling. Superfold affords greater production, greater carbon economy, and less lost motion than any ordinary method of writing orders, invoices, or other records. It is conceded to be one of the fastest methods of multicopy writing known to progressive business.

Superfold forms are made from one sheet of paper as wide as the combined widths of all the parts and in any desired length, printed on specially constructed presses at one time, so that the various parts fold under each other in perfect registration. After edges and hinges have been cut off, they are "superfolded" into corrugated board containers for shipment and use. They can be made in any width and almost any depth. They can be printed on either a very inexpensive paper or on high-grade bond paper, on one or both sides. As it has become almost a universal practice to differentiate forms similar but used for different purposes by means of different colors, a paper-tinting process has been developed to carry out the color scheme. In cases where forms are to be filed in post binders, holes can be conveniently punched in any required position on the form. Carbonized backs may be placed on the form with either a small spot or a large surface. Should it be desirable, perforation may be made either vertically or horizontally on any one or all of the forms. These forms may also be numbered consecutively.

Printing of Continuous Forms.—Contrary to the prevailing custom which dictates that continuous forms be printed from stereotype metal plates which are cheaper and which, due to their comparative softness, pound down and become uneven in the press run, the latest development has been the adoption of the solid-backed, heavy copper, shelled electrotype. While the cost of this process is considerably higher, it produces a positive impression that has a tendency to make the form even in tone.

By this unique process a degree of perfection is effected in its electrotypes that results in what might be termed micrometer contact between printing plate and paper. The old and often uncertain method of underlaying with paper to compensate for unevenness in the printing surface of the plate is practically eliminated by this process, which employs extra heavy-shelled proved level electrotypes. To keep full color impressions from offsetting or smudging, there has been perfected a system of gas drying which fixes the ink permanently, immediately after its contact with the paper. The clean solid color characteristic of continuous forms printed in this manner is the result.

Some Objections to Using Continuous Forms.—While many objections have been raised to the use of continuous forms, it might be well to point out briefly a few predominating objections and answers for the benefit of those who contemplate using this style of form, in either order writing or billing applications.

The objection that the continuous form curls is a hard one to overcome. It applies more to the shorter form than it does to the longer. The longer form will not curl nearly so much as will the smaller, due to the fact that it has a longer pull and larger writing surface and spread after being taken off the machine. However, it will curl a little. But speed in the preparation of records is of much greater importance than is a nicely bound book of cut forms.

Other objections have been raised, such as torn or ragged edges on original invoices. To overcome this, the original (if used as an invoice) may be made as a cut form, and the copies in continuous length. Lithographic printing on the original, or something better than the paper stock used with the rest of the set, may be used as an invoice which must be placed or laid on the top of the set and properly aligned when writing.

There is a distinct advantage in the use of roll forms over fanfold and superfold forms in certain applications of the auto-

matic feed type of writing machine, due to the fact that the number of copies of the same set of forms can be varied much more readily on rolls than with fanfold or superfold forms. For instance, if an operator has a set of forms, say seven copies, varying to eight or nine copies, she cannot change them where the fanfold or superfold method is employed. The operator may have work which requires nine copies in one case and seven in another. When using the roll form, she can easily segregate these and throw back one or two forms, as the case may be, and use the sets in that way without much difficulty. With the fanfold or superfold method, the operator is required to waste two out of nine forms in order to write seven, because of the fact that there is no way of taking out or putting back a single strip of forms. Another advantage of rolls over other continuous forms is that they permit various grades of paper to be used for different copies. A high-grade bond on the original and a grading of the other copies is possible, which, in many cases, result in considerable saving in the cost of paper requirements.

The question of roll form alignment is sometimes regarded as objectionable, and in many cases is considered a serious disadvantage. However, it is not nearly as serious as some users try to make it. If the roll forms are printed and punched properly, little difficulty will be encountered. The question of alignment is merely one of proper punching. In printing these forms, in order to obtain proper alignment two black circles should be printed at the bottom of the form. These circles should be printed on a slow-speed press, and the punching arrangement of the press should be carefully set so as to produce perfect registration with the black circles indicating the position of the holes to be punched. Some printers do not print black circles on continuous length forms for the purpose of assuring proper punching registration, and when the forms are fed through a high-speed press, such a process has a tendency to

throw the forms out of alignment, and when set up in the automatic feed machine much difficulty in alignment is encountered.

Form Design for Accounting Machines.—The designing of forms to be written by mechanical accounting devices is more complicated to develop than those forms which are to be written by hand, due to dimension requirements of the machine's writing surfaces. In view of this fact, the designer is often met with the problem of machine dimensions, and much time is lost in form design when the proper machine equipment is not available. With a view of assisting those engaged in such work, the following data were developed to give the needed information concerning the dimensions of the various accounting machines in use.

Importance of Machine Platen Measurements.—For form design purposes for the various types of equipment, it is necessary to have a knowledge of platen widths and length of the writing line of the machine upon which the form is to be written, together with a scale divided into tenths and sixteenths.

The extreme writing and adding position on most machines of the cylindrical writing and printing platen types is located at "zero" on the carriage scale. Dimension requirements of column widths are governed by the number of key impressions or "ems" to the inch the machine will write or print. Let us, for the purpose of illustrating, see how a column width is determined by taking a machine where the number of key impressions are 10 to the inch. Suppose the capacity of the column in which figures are to be written will not exceed a total of 999 99 when added. The width of that column may be safely placed at 8/10 or 9/10 of an inch; that is to say, 6/10 for the space taken up by the amount (999 99), and 1/10 each for the left and right-end margins of the total so written. When a "clearance symbol" is to be printed or typed, such as is the case with most accounting machines when the new balance is extended, an allowance of an extra tenth of an inch

should be made, making the total width of the column 9/10 of an inch. The next important factor to be considered is the width of the form, allowing for proper binding margin. Exactness of dimensions must be strictly followed throughout all forms that are to be tumbled or turned over, i.e., used on both sides.

In the case of equipment of the flat-printing platen type, a ledger card measuring more than 8⅛ inches in height, or a statement measuring more than 6⅞ inches in height, cannot be used, although the width of both forms may be 6 inches or less as the length of the writing lines is 6 inches.

Descriptive writing equipment of the flat-writing platen type is obtainable with platen widths measuring 11, 16, and 24 inches respectively. The distance from left platen rail to center of the punching for the proof sheet carrier measures 12, 17, and 25 inches respectively. The distance from left platen rail to right edge of proof sheet is 12, 17, and 25 inches, plus 7/32 inch distance from center of the punching for the proof sheet carrier to edge of sheet. The extreme distance between left and right platen rails is 12 15/32, 17 15/32, and 25 15/32 inches respectively.

In designing forms which include a proof sheet for descriptive writing equipment of the flat-writing platen variety, a sheet of paper can be used 12 7/32, 17 7/32 or 25 7/32 inches wide, according to the size of the machine platen adopted for use. The first adding position is at "3" on the carriage scale (except when using a card clamp or holder for writing on cards). The position at "3" on the carriage scale is 1 inch (or 23/32 inch plus 3/10 inch) from the left edge of the sheet. This brings the first perpendicular column ruling of the ledger sheet, as well as the left edge of the proof sheet a little to the left of position at "3" as indicated by the carriage scale.

Column widths may be measured as desired from position at "2" as indicated by the carriage scale. It should be remembered that upon a cross-footer with proof sheet carrier, it is

only possible to write and add to 105, 155, or 235 on the carriage scale of 11, 16, and 24-inch platen machines. Without the functioning of the cross-footing device, it is possible to write and add to 107, 157, or 237 on the proof sheet carrier.

The extreme right writing and adding positions on flat-writing platen machines not equipped with cross-footing mechanism are 110, 160, or 240 on the carriage scale. The extreme left writing as well as the adding position is "0" on the carriage scale.

The card clamp referred to extends from top to bottom of platen on the left side. The card stop is located 15/16 inch from the inside of the side rail, and the card is thus moved 15/16 inch to the right of the normal position under the left platen rail.

The punching of proof sheet holes is a very important factor to be considered and must be made with a standard punch 7/32 inch from the edge of the proof sheet to center of hole.

Design of Tabulating Machine Cards.—The form design requirements of tabulating and recording equipment applicable to the punch card method is illustrated in Figure 2, showing four cards:

1. Single card form to be developed.
2. Single card form developed and punched.
3. Dual form card to be developed.
4. Dual form card developed and punched.

Card No. 1 illustrates the usual form card. Its exact size is 7⅜ x 3¼ inches. Of course, it goes without saying that all cards used in equipment of these types must be of uniform size, but machines are also built to handle cards measuring 5⅝ x 3¼ inches. It will be noticed that these cards consist of a series of figures in 45 different columns, in each of which are printed numbers advancing from 0 to 9. The cards can be headed so as to attach any special meaning to any column or group of consecutive columns that may be desired. It is by no means necessary that this grouping should be identical in

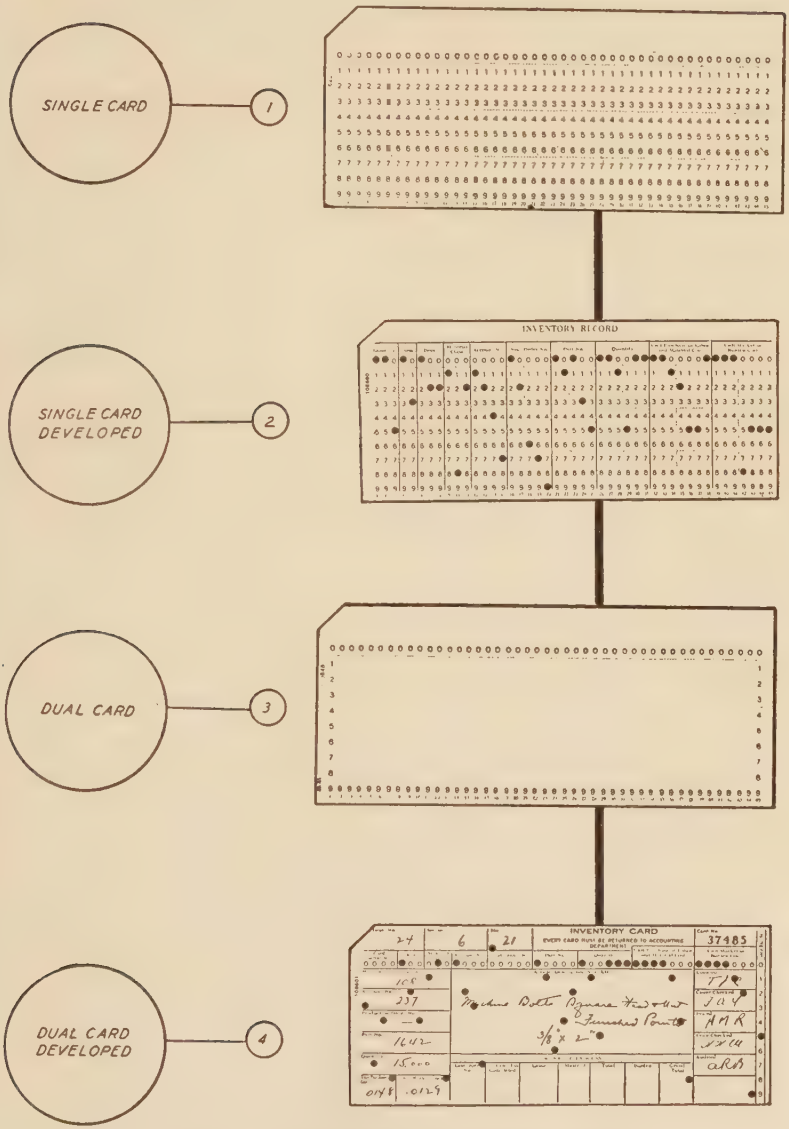


Figure 2. Form Design of Tabulating Cards

the case of all cards used in one accounting application; on the contrary, it is practically certain that some variations will be found exceedingly useful, if not essential. The meaning of "dual" card implies that it can be used as a medium for tabulation and an accounting record with original memorandums, as may be seen by the illustration. To avoid confusion, it is desirable that each different card should be distinctly colored so that one can tell at a glance by the color of the card the class of information that it is designed to record.

Cards No. 2 and No. 4 illustrate a developed unit and dual card punched, respectively. It may be stated, however, that for many purposes a number of columns considerably less than 45 is all that is required in practice. The punching, sorting, and tabulating features have been previously explained. In all cases the effective figure is the figure that has been punched out, while the meaning is determined by the heading of the column in which the perforation appears, thus, the reading of card No. 2 is as follows:

Columns 1, 2, and 3 (grouped together) show that the number of the inventory sheet from which the data are being punched is 5.

Columns 4 and 5 relate to the number of the item appearing on the inventory sheet, which in this case is item 3.

Columns 6, 7, and 8 (grouped together) show that the department in which the inventory was taken is 22.

Columns 9, 10, and 11 (grouped together) indicate the code or class number of the material, which is 182.

Columns 12, 13, 14, and 15 (grouped together) relate to the account affected, which is 1247.

Columns 16, 17, 18, 19, and 20 (grouped together) indicate the production order number to which the inventoried materials apply. The production order number is 2679.

Columns 21, 22, 23, 24, and 25 (grouped together) indicate the part number of the merchandise inventoried which is 1035.

Columns 26, 27, 28, 29, 30, and 31 (grouped together) relate

to the quantity of the merchandise inventoried, which is 1,500 units.

Columns 32, 33, 34, 35, 36, 37, and 38 (grouped together) indicate the unit purchase or labor and material cost of the merchandise inventoried, which in this case is 1.2550.

Columns 39 to 45 (grouped together) relate to the unit market or burden cost of the merchandise inventoried which, in this case is .8555.

Physical Characteristics of Forms.—The physical characteristics of specific forms for use on mechanical accounting equipment, as well as the procedure governing their use after they have been machined, depend upon the nature of the transactions for which they are used. If extreme care is not taken in their design and intended action, they will lose their effectiveness in the conduct of an efficient accounting routine. A form for factory use should be fairly small and compact, whereas forms for office use are less limited in this respect, although odd sizes and shapes require special binders or files, and forms larger than 18 inches deep by 24 or 36 inches are a little difficult to handle.

Consideration of Standard Sizes of Paper Stock.—Having established the purpose of the form and the type of equipment upon which it is to be written, the next step is to consider the standard sizes of paper and cardboard stock available. Printers are usually prepared to make up any size specified, but waste may prove expensive if a standard sheet does not cut up evenly. Bond paper comes in sheets 17 x 22 inches and 19 x 24 inches; some kinds are obtainable in the 34 x 44-inch size. All of these sizes are practically multiples of the 8½ x 11-inch or standard letter-size sheet. Therefore, all forms of this stock may well be based on the 8½ x 11-inch size. Divided in two, the 11-inch way gives 5½ x 8½ inches, or nominal 5 x 8-inch size sheet; quartered, a 4 x 5½-inch size, which may be used in place of a 4 x 6-inch sheet. Halved, the 11-inch way, and divided in three parts the 8½-inch way,

makes a 2¾ x 5-inch sheet, which may be used in place of 3 x 5-inch forms. The 5½ x 8½-inch size doubled gives an 11 x 17-inch sheet—a very convenient size for office use which is to be bound on one edge. Doubling the 11-inch dimension of an 11 x 17-inch sheet gives a 17 x 22-inch sheet —another size highly desirable for office use. Ledger stock which is preferably used for the more permanent office records may be had on the same basis as bond paper, the most common size being 17 x 22 inches.

Manila cardboard stock that is very often used for work tickets, route tags, and other forms which receive hard usage, comes in sizes measuring 24 x 36 and 22 x 28 inches. The first size (24 x 36 inches) may be divided up into sheets measuring 6 x 6, 4 x 4, 4 x 6, 8 x 12, 3 x 6, and 3 x 9 inches. The second size (22 x 28 inches) may be divided nicely into 11 x 14, 5½ x 7, and 4 x 5½ inches. For tags, however, it is desirable to select one of the styles which are considered as standard with tag makers. Index bristol—the card index stock—is obtainable in sheets measuring 25½ x 30½, and 22½ x 28½ inches. The first size divides with only a half-inch waste on either side when cards measuring 3 x 5 inches are made up, and almost as economically into cards with dimensions of 4 x 6, and 5 x 8 inches. In working out a size of a form, a good method of arriving at the most desirable and economical dimension is to make up a complex fraction of which the paper size is the numerator and the trial dimensions of the form the denominator, then adjust the dimensions until they cancel with the least amount of remainder.

Paper stock is available in sizes other than those previously mentioned, and may be cut up economically to many dimensions. Since there is a wide latitude for improvement in the average accounting system in regard to the standardization of form sizes, particular attention should be given to that phase of the matter in form design. Although form sizes have a tendency to vary with the purpose of an accounting condi-

tion, and variation in size is sometimes erroneously used as a means for distinguishing different forms, it is far better to vary the color and kind of stock than size, provided the same information can be tabulated upon it conveniently. Forms measuring 8½ x 11 inches and under are usually filed at one stage or another in standard vertical files, and it is, therefore, a desirable and economical practice to standardize on the regular sizes 8½ x 11, 5 x 8, 4 x 6, and 3 x 5 inches, or slightly less. The large-size forms used in general and cost accounting routines should be governed by the stock sizes of the binders that are to be used. Exceptional care should be taken in the selection of binders for use in connection with accounting machine methods, for the time element involved in the opening and closing of the binder and other features which have to do with the preparation of work before machine operations are very important factors.

As to the kind of stock to be selected for any given form, discrimination is very necessary. The natural tendency, looking at low first cost rather than service, is to buy the cheapest. A form that is not suitable for machine use in regard to size and thickness, or if so thin as not to be capable of withstanding the machine key impressions, is expensive at any price. Bond paper comes as light as 13 pounds to the ream measuring 17 x 22 inches, but 16-pound paper is more desirable for ordinary service, and if extra rough usage will be given the form, the weight of the stock used in the form should be at least 20 pounds. In cases where the carbon duplicates go no further than the office follow-up file and are not used extensively, a minimum weight of paper of the poorest quality may be safely employed.

Manila card stock may be obtained as light as 80 pounds, but service has proved this weight to be too flimsy and not able to withstand usage. Manila card stock weighing about 110 pounds is about as light a weight as should be employed for forms to be used in the factory, and where an especially stiff

form is required, a weight not less than 140 pounds should be used. Care should be taken in the selection of the type of mechanical accounting equipment that will conveniently handle to the best advantage a form of such heavy material.

Color Schemes Found Practicable.—Color also is an important consideration. Bond paper offers the largest variety, as it can be had in practically every shade and hue, and every available color is often required where a color scheme of forms is in vogue. Where such distinction is of little consequence, it is desirable to standardize on a canary yellow for factory forms, and white or buff for office copies. Canary yellow has proved very desirable for factory use, because it is capable of taking pencil notations well and does not show dirt. Moreover, canary yellow is very easy on the eyes of the user, although buff is favored by some as involving less eye-strain. Bristol board is usually white, although it can be had in buff and salmon; and manila has its own characteristic color. Blue, green, and red manila stock can be secured for special purposes. Red route tags, for instance, may be preferably used for special purposes, but for clearness a light manila color is recommended because of its aid to legibility.

CHAPTER IV

ORDER WRITING AND BILLING SYSTEMS

Application of Equipment to Order Writing and Billing Systems.—In describing the various machine applications of order writing and billing systems, it is not attempted in this volume to cover every possible situation with which one is apt to come in contact, nor is it attempted to distinguish between the requirements of different lines of business. The routines that are described in this chapter indicate in general how these requirements are handled on mechanical descriptive writing equipment, such as the plain writing machine and the automatic form feed machine.

The success of applying such equipment to order writing and billing routines depends, in the first place, on the favorable consideration given to the development of a set of forms and routine best meeting all requirements, in other words, a workable system; and second, on the mechanical superiority and distinctive features of the machine that will best handle the condition.

Typewriter Versus Writing Machine Method.—The preparation of orders and bills with the use of typewriters has long been regarded and accepted as an efficient and economical means of handling this type of work. This general belief is undoubtedly based on the advantages of typewritten over handwritten methods. Considerable progress in business methods, however, has been made since the typewriter first came into practical business use; and just as the typewriter superseded the slow and laborious pen methods, so mechanical accounting equipment is destined to supersede the present typewriter

methods, remove from them the last vestige of the many non-productive elements inherent in the preparation of orders and bills with the use of the ordinary typewriter, and place such methods on a straight productive basis. The effort usually involved in the routine work of these applications is often out of all proportion to that required in any other branch of accounting. While the prime requisite of every phase of clerical routine is accuracy, the question of volume and speed, in so far as it has to do with writing miscellaneous forms, has ever been an issue of great importance.

The reader is not required to stretch his imagination to any great degree in order to realize the non-productive and productive factors that are involved in writing such forms as bills, orders, requisitions, bills of lading, etc. In analyzing the procedure involved in the typewriter method, comparison may be made of the amount of time used by the clerk in actual writing on the typewriter, with the amount of time consumed by the necessary operations in preparation for the actual writing, and remembering that only actual writing is productive and that all other operations are non-productive. It should also be borne in mind that the non-productive operations under typewriter methods are repeated with the writing of each set of forms a hundred or more times each day. It will be quickly realized that a clerk's time consumed in non-productive operations is a complete loss, if that time cannot be utilized in actual production to the fullest extent.

The non-productive operations referred to are operations such as the insertion of loose sheets of carbon paper between cut forms, jogging the sets of forms and carbon paper into alignment, inserting and realigning the set in the typewriter before locating the first writing position, removing the carbons, etc. These operations are no longer necessary with the improved automatic form feed writing machine.

There are several types of automatic feed machines in use that eliminate the non-productive operations in writing forms

permitting the clerk's efforts to be devoted entirely to actual writing or productive work. All lost motion is eliminated by the combination of the continuous length, automatically fed forms and carbon paper. The time wasted in removing loose sheets of carbon paper from completed cut forms, and in cleaning smudged hands is no longer necessary, as the labor-saving devices of this type of equipment save the time consumed in the handling of loose sheets of carbon, and in addition eliminate the waste of carbon and effect a considerable saving in its use.

Application of Plain Writing Machine—Unit Order Writing System

Unit Order Writing System Procedure Explained.—Orders are usually received through two channels—from the salesman, or direct from the customer, either by telephone, telegraph, mail, or in person. The information on the salesman's order blanks in the one case, or that written on the customer's letterhead or order blank in the other case, or received verbally, must be transcribed to a standard form in order to obtain the required number of copies, and in some cases, to list the merchandise in such a way that it can be easily understood by the manufacturing departments, or in the case of some concerns easily selected from stock.

The forms adopted in this specific routine are given below, while Figure 3 illustrates the progress of a customer's order.

1. Office copy
2. Acknowledgment of order
3. Branch office copy
4. Order register copy
5. Cost copy
6. Departmental copy
7. Shipping department copy
8. Assembly copy
9. Shipping label

10. Three copies of bills of lading or express receipts
11. Packing list
12. Stockroom copy
13. Factory or works office copy
14. Statistical copy

1. Office Copy or Unfilled Order Copy. This copy is retained in the order department as a record. It is used as a reference to the order while it is being filled.

2. Acknowledgment of Order. An acknowledgment copy mailed direct to the customer has the advantage over a post card or form letter acknowledging the order, because if a mistake is made in transcribing the order, the customer can check this up and advise as to any discrepancy before the shipment is made. For example, the wrong shipping instructions might be given, or a mistake made in the quantity of an article ordered. By sending a copy of the order as an acknowledgment, the labor of writing or filling in a post card or letter is saved and a copy of the order also gives more complete information.

3. Branch Office Copy. This copy is used where a concern has a branch office which has been instrumental in getting the order, or from whose territory the order has originated. This copy is sent to them for their information and files.

4. Order Register Copy. An order register is maintained by all progressive firms. Many companies use a bound book or loose-leaf record book in which they write in chronological order information as to the orders received. Ordinarily this information is very scant, showing only the order number, date entered, the name and date shipped. Under pen methods most order registers are maintained in numerical sequence, because as orders are entered they are usually given a registration number. Under such a system the order register is constantly used as a reference when only the order number

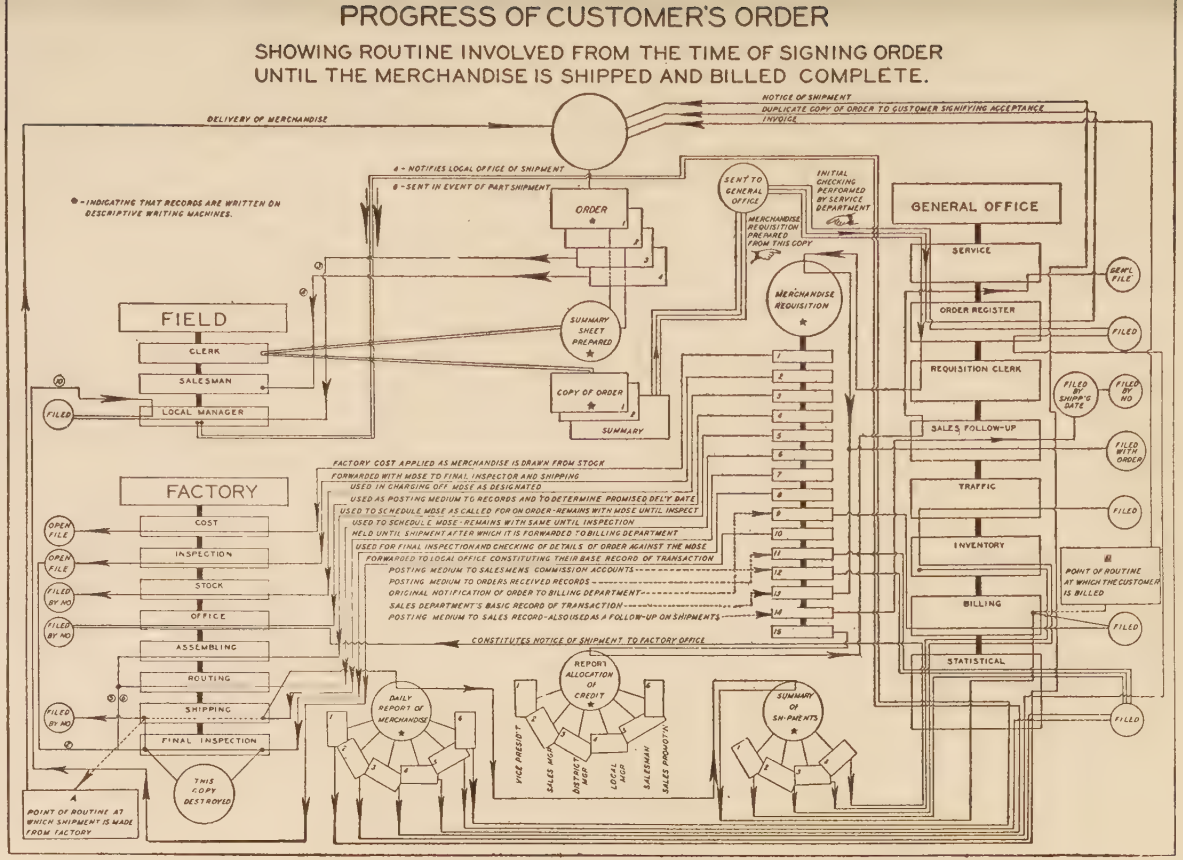

PROGRESS OF CUSTOMER'S ORDER
SHOWING ROUTINE INVOLVED FROM THE TIME OF SIGNING ORDER
UNTIL THE MERCHANDISE IS SHIPPED AND BILLED COMPLETE.
DELIVERY OF MERCHANDISE
NOTICE OF SHIPMENT
DUPLICATE COPY OF ORDER TO CUSTOMER SIGNIFYING ACCEPTANCE
INVOICE
A - NOTIFIES LOCAL OFFICE OF SHIPMENT
B - SENT IN EVENT OF PART SHIPMENT
* - INDICATING THAT RECORDS ARE WRITTEN ON DESCRIPTIVE WRITING MACHINES.
ORDER
SENT TO GENERAL OFFICE
INITIAL CHECKING PERFORMED BY SERVICE DEPARTMENT
MERCHANDISE REQUISITION PREPARED FROM THIS COPY
GENERAL OFFICE
SERVICE
ORDER REGISTER
REQUISITION CLERK
SALES FOLLOW-UP
TRAFFIC
INVENTORY
BILLING
STATISTICAL
MERCHANDISE REQUISITION
SUMMARY SHEET PREPARED
COPY OF ORDER
SUMMARY
FIELD
CLERK
SALESMAN
LOCAL MANAGER
FILED
FACTORY
COST
INSPECTION
STOCK
OFFICE
ASSEMBLING
ROUTING
SHIPPING
FINAL INSPECTION
OPEN FILE
FILED BY NO
THIS COPY DESTROYED
POINT OF ROUTINE AT WHICH SHIPMENT IS MADE FROM FACTORY
FACTORY COST APPLIED AS MERCHANDISE IS DRAWN FROM STOCK
FORWARDED WITH MOSE TO FINAL INSPECTOR AND SHIPPING
USED IN CHARGING OFF MOSE AS DESIGNATED
USED AS POSTING MEDIUM TO RECORDS AND TO DETERMINE PROMISED DELY DATE
USED TO SCHEDULE MOSE AS CALLED FOR ON ORDER-REMAINS WITH MOSE UNTIL INSPECT
USED TO SCHEDULE MOSE - REMAINS WITH SAME UNTIL INSPECTION
HELD UNTIL SHIPMENT AFTER WHICH IT IS FORWARDED TO BILLING DEPARTMENT
USED FOR FINAL INSPECTION AND CHECKING OF DETAILS OF ORDER AGAINST THE MOSE
FORWARDED TO LOCAL OFFICE CONSTITUTING THEIR BASE RECORD OF TRANSACTION
POSTING MEDIUM TO SALESMENS COMMISSION ACCOUNTS
POSTING MEDIUM TO ORDERS RECEIVED RECORDS
ORIGINAL NOTIFICATION OF ORDER TO BILLING DEPARTMENT
SALES DEPARTMENT'S BASIC RECORD OF TRANSACTION
POSTING MEDIUM TO SALES RECORD - ALSO USED AS A FOLLOW-UP ON SHIPMENTS
CONSTITUTES NOTICE OF SHIPMENT TO FACTORY OFFICE
DAILY REPORT OF MERCHANDISE
REPORT ALLOCATION OF CREDIT
VICE PRESIDT
SALES MGR
DISTRICT MGR
LOCAL MGR
SALESMAN
SALES PROMOTER
SUMMARY OF SHIPMENTS
GEN'L FILE
FILED BY SHIPG DATE
FILED BY NO
FILED WITH ORDER
POINT OF ROUTINE AT WHICH THE CUSTOMER IS BILLED

Figure 3. Chart Illustrating Progress of Customer's Order and Routine Involved

is known. In the place of such a record many concerns have adopted the use of copies of the orders as the order register, which are bound in numerical sequence. This latter system eliminates the work of writing up the order register, and also affords more complete reference, because in addition to the skeleton information contained in the book, a complete copy of the order is available.

5. Cost Copy. This copy is dispatched to the cost department to serve as a medium from which to figure the cost on a particular order. It should be in such a form that the cost information may be conveniently entered. Sometimes two additional columns are required for unit and total cost, so that the cost copy must be wider than the others. Often, however, it may take various other forms to provide for entering the labor, material, and overhead cost. The requirements of the business and the extent to which costs have been standardized govern the design of this form.

6. Department Copy. It has been found that the best plan is to supply each department with a copy of the order, even though they are only concerned with their own particular part of the order. This applies especially to departments in manufacturing concerns where it requires some time to produce the merchandise, although it is often used for the different departments of a wholesale concern to select and forward their part of the order to the shipping room.

If departments do not receive a copy of the order or instructions in regard to the work to be performed, one copy of the order is often attached to the merchandise, as it moves progressively through the factory from one department to another. In the case of an assembly job under such conditions, the copy is sent successively to the different departments for them to select or manufacture the material which affects them.

While the knowledge of production requirements in va-

rious centers of a manufacturing plant is very indefinite to most foremen, it seems reasonable to expect that if a copy of the customer's order were furnished them, it would enable them to obtain an intelligent conception of work that must be done, as well as a knowledge of what work is ahead. With such data foremen can properly plan operations for their departments, so as to be prepared for peak production periods.

The filling of the order can be much simplified and the operations speeded up by employing multiple copies, which have the following advantages:

(a) Each operating department, if there is no planning department, can figure more efficiently on the work that is ahead of it and that is in process. It does not have to wait until some other department has finished with its portion of the order, before it knows what will be required.
(b) It facilitates the filling of the order, because each department can work simultaneously on its portion. This often enables the planning or routing of orders to be done more scientifically and efficiently.

Another practice which is common is to copy the different portions of the order on a separate slip, each department receiving its respective slip. The disadvantages of this practice are as follows:

(a) Errors may be made in copying.
(b) Each department could understand its portion better if it were furnished with a complete copy of the order, thus avoiding frequent reference and loss of time in consulting the original order.
(c) The extra labor of recopying can be eliminated.

7. Shipping Department Copy. This is held on file by the shipping department until they have received the merchandise from the various departments which furnish them

with the items covered by the customer's order. Then they make shipment of the merchandise on their copy, showing date of shipment, how shipped, weight of merchandise, serial number, and other necessary data.

The shipping department may in turn send their copy to the factory, or works office, which department may then send it back to the order department. The shipping department may also be the assembly department and assemble the goods from this shipping copy before they are packed and shipped.

8. Assembly Copy. In case the assembly department is a separate department it may also be furnished a copy, so that they may have complete information concerning what merchandise is to be received and how it is to be assembled. This may also include the testing.

9. Shipping Label. In writing the order it is sometimes possible to include a label. This label contains only the name and address of the consignee—the party to whom the goods are to be shipped. It is not always practicable to attempt to include a label in the order set; this is possible only when one label is needed for each shipment. Where there are a number of packages or boxes to an order, it is not practicable. When the label is written at the same time as the order, it is sent to the shipping department with their copy of the order.

The advantage of writing the label at the same time is not only the advantage of eliminating that operation, but also of insuring the correct name and address of the customer. The more records written at one operation, the less errors due to recopying will be encountered, hence less checking will be required in order to insure correctness.

10. Three Copies of Bills of Lading or Express Receipts. Where the majority of shipments are made by freight, it is possible to include the bills of lading in the order set, making 3 or 4 copies, according to the requirements. In the

majority of cases, all that can be done is to write on the bills of lading the name and address of the consignee and the routing; the balance of the bills of lading will have to be filled in by the shipping clerk. There are instances where, at the time of making up the order it is known just how many packages there will be. The order, for example, will read, "One barrel of oil." In a case of this kind the body of the bills of lading could also be filled in. These instances, however, are comparatively rare unless few commodities are sold and standard packages are used.

There is another distinct advantage in heading up the bills of lading at the time of writing the order, aside from the saving of time in not being obliged to recopy the name, address, and routing. There is no possibility in writing the order of specifying shipment to one firm and addressing the goods to another firm.

What has been said of the bills of lading is just as true of the express receipts. If the shipments are made by express, the express receipts may be included in the order set.

11. Packing List. Some firms include a copy of the order in the packages, cases, or other containers that are being shipped. On this copy the shipping clerk stamps or otherwise indicates by notations any items that have been omitted. The customer uses this to check off the goods in order to determine whether there are any discrepancies between his order and the actual shipment of the goods. This packing list is often combined with the label by having a perforation between the heading and the body of the order. The heading is then used as a label and the body of the order is the list of goods ordered and is used as the packing list.

12. Stockroom Copy. In case the complete order or parts of the order are filled from stock, the stockroom is provided with a copy in order to select the goods, as explained above, and for the additional purpose of keeping their stock

records. In that case it often is used as a posting medium for their perpetual inventory.

13. Factory or Works Office Copy. In case the concern has a separate factory or works office, they should receive a copy of the order so that they can direct the manufacturing processes.

14. Statistical Copy. The statistical department, as a general rule, is concerned only with the statistics of actual sales, and for this purpose is furnished with a copy of the bill. However, some of the larger concerns wish various classifications and the data concerning the unfilled orders. In that case this department should be provided with a copy of the order.

Orthodox Method of Preparing and Transcribing Orders.—The following is the general routine of an order prepared and transcribed in the order department.

The office copy is filed in an "unfilled order file"; the "acknowledgment of the order" is mailed to the customer; the "branch office copy" is mailed to the branch office; the "order register copy" is filed numerically in an "order register binder"; the "cost copy" is sent to the cost department; the "statistical copy" is sent to the statistical department; the various "manufacturing department orders," together with "factory or works copy," "shipping department copy," "stockroom copy," "label," "bills of lading or express receipts," and "packing list," are sent to the works office for distribution.

When the various departments have manufactured the items called for on the order, they are sent to the assembling department where they are assembled, inspected, tested, and then forwarded to the shipping department. The shipping department makes notations on its copy of the order, showing the date of shipment, how shipped, the items, etc., and sends this copy to the order department of the general office. The order department takes their copy of the order, which they have been

holding, out of the "unfilled orders file" and destroys it if they have no further use for it. The shipping department copy of the order is then priced and extended, sent to the billing department for invoicing, and returned to the order department and filed permanently as a "filled order." The information as to date of shipment, etc., which appears on the filled order, as well as the date of billing and the bill number, is transcribed to the order register copy.

Disadvantages of Using Customer's Purchase Order Exclusively.—A common method of handling orders is to fill from the original sent in by the customer. Concerns which do this feel it is not necessary to go to the trouble of writing up their own order form, but that they can fill the order just as well by using the customer's form. There are few cases in which this method of filling is justified because the disadvantages are very great:

1. There is the danger of losing the original copy of the order. One lost order may cause sufficient loss to pay for writing up orders for a considerable length of time. In addition to the actual loss, the loss of goodwill, which cannot be estimated, must be considered.

2. While the order is being filled, there is no record of it in the office. Thus, if there is any correspondence regarding the order, or any change desired by either the customer or the office, it is considerable trouble to trace and locate the copy of the order, which is in process of being filled somewhere in the warehouse or factory. This causes loss of time and general confusion.

3. The customer is not always particular as to how he sends in the order. Orders come in variously written, on various order forms—some legibly typed with complete descriptions, others handwritten, carbon copies, incomplete as to specifications, and otherwise confusing. This frequently makes it necessary for the men in the warehouse or factory to consult the office for further specifications, and causes mistakes in filling the orders. The result is time and money lost.

4. With only one copy of the order, it must be used successively by the various departments which the order affects. This makes for confusion in several ways:

(a) The constant handling may render the copy illegible.
(b) The various departments must await their turn in order to commence working on the order, and the work cannot be as efficiently planned as when each department knows just what is ahead of it.
(c) The successive use of the order in this fashion may also delay its prompt filling, as compared with the system where each department receives its own copy enabling it to work simultaneously on the order.

Advantages of Using Standard Order Forms.—The remedy is to write up all orders on standard forms with as many copies as can be advantageously used. This insures correct and complete specifications, legibility, and a smoother working routine. As a general thing, the cost is negligible compared with the results accomplished.

Even where the order is rewritten, it is common to have one copy move with the merchandise through the various departments successively. The reason for this is that sometimes the equipment used does not allow a sufficient number of copies to be made in order to give each department a legible one.

In some cases it has been found desirable to write orders, list the various processes through which they must pass, and require a separate slip for each process to be furnished each department. In these cases it is suggested that a large order form be used, with small cards or slips placed on top of the order, as the various processes are written successively, each small card receiving only one process. These carbonize through onto the large order form, which becomes a complete transcript of the order.

Other cases where this same principle of combining records is used, is in connection with the order register. In these

cases the order register is a large sheet, which remains in the machine, the orders being written on smaller forms one after another, so that the large order register will receive the carbon impressions of 6 or 7 orders.

Orthodox Method of Back Ordering.—Another very important phase of order department work is "back ordering." The two principal methods in use are as follows:

For the first method the case of entering a "manufacturer's order" or a "jobber's order" may be used as an illustration. If the order calls for 10 items and only 8 of the 10 items can be shipped, the remaining 2 must be "back ordered." It is a common practice among some concerns, to permit the factory or plant to retain their copy of the order until it is completed. They simply mark on the order that 8 of the 10 items have been shipped, and the date of shipment. Where there are a number of part shipments on an order, the order soon becomes all marked up, so that it is difficult to know what has not been shipped.

The second method of "back ordering" is much better. Suppose order No. 1700 is sent to the factory for 10 items, but they ship only 8. The order is returned to the order department as if it had been completed, but with a notation showing that only 8 items have been shipped. The order department then makes up a new order with the same serial number as the original order, but affixes the letter "A." In other words, the first "back order" would be No. 1700A. If a second back order becomes necessary on this same order, it would be No. 1700B.

The advantages of the latter system are, in the first place, that the factory has nothing in its files but active orders—items that have not been shipped. It is unnecessary to constantly look over numerous orders that have been partially shipped but remain in the file to confuse the records. It also eliminates the danger of some clerk forgetting to check off an

item on an old order, thus avoiding duplicate shipments through carelessness. It gives the order department the advantage of filing these back orders separately under a subdivision, so that they can be more readily followed up to hasten shipment; otherwise it would be necessary to go through a lot of orders and numerous items to find out what was "back ordered."

It is true that the rewriting of these back orders takes time, but actual experience has proved that the time consumed in doing this is nothing compared to the increased efficiency resulting from the system. It eliminates mistakes in the factory; it eliminates duplicate shipments; it saves time consumed by the order department in referring to those orders; in brief, it enables the order department to keep in close touch with all back orders. Then too, with this method of back order system, the bill of lading or express receipt can always be included in the one complete set of forms.

Use of Automatic Form Feed Machines for Order Writing.—The question of writing orders on automatic form feed machines is merely a question of mechanics. The system and the use of the various copies is exactly the same as under the unit order writing system. Wherever an original record and one or more copies are written, there is a possibility for the application of the automatic form feed machine.

The ideal situation is a set of forms with the same number of copies required each time, and the total number of copies, ten or less. However, there can be variations which may be handled on an automatic form feed machine. The length of the forms must be uniform throughout all copies, but they may be of different widths. It is better to keep the size uniform, if possible, although different widths work very well and can be adopted. As a general rule, the reason for having the copies of varied widths is to eliminate certain information on various copies. If this is the sole reason, it is often possible to have the forms of a uniform size, and to

eliminate the information by the use of short, narrow, or cut-out carbons, by the "block-out" printing method, perforation, or by carbonizing the back of the forms.

In case a heavy card is to be one of the copies, it is usually impracticable to use an automatic feed machine. However, the authors know of cases where a light-weight card is used, and while such applications are unusual, they can be successful if the card is of proper thickness and weight. It can be a cut card which is placed on top of the set, or it may be in continuous strips.

When requirements necessitate a varying number of copies, either one of two things must be done to use an automatic form feed machine. In the first place, the maximum number can be written and the extra copies thrown away. This is very desirable in case the variation is not great or frequent, as the cost of paper is negligible compared with the saving effected. Secondly, the minimum number can be written, and additional copies as required can be placed or laid on top of the set and properly aligned when writing.

Use of Automatic Form Feed Machines for Billing.— In applying automatic form feed machines to billing, the proposition is similar to that of order writing, in that it is entirely a question of mechanics. Neither the routine nor the method of handling has to be changed. In billing it is usually a simple proposition, because the copies are normally the same size, and the same information usually must be shown on all copies.

The chief reason advanced against using automatic form feed machines for billing is that they are not practical for the preparation of condensed customer's bill with a sales sheet. While the feature of the sales sheet might be deemed essential, it will be shown later that a unit copy of the bill would accomplish the same purpose as well, if not better. The speed and production which can be obtained on an automatic form feed machine is so much greater than with a plain writing

machine, that in the majority of cases the former is adopted in preference to the latter.

Combination of Forms Written Simultaneously.—Besides providing copies of the bill for various purposes such as branch office, accounting department, sales department, etc., there are other combinations such as:

1. Cost copy.
2. Shipping records, including labels, packing slips, and bills of lading, etc.
3. Ledger copy and various other combinations.

Where the cost copy is adopted, provision must be made thereon for figuring cost. It is desirable to provide for this in such a way that the size of the cost copy is uniform with the other copies. Often it is possible to use the back of the form for costing with suitable printing for convenient figuring, in which case the uniform size may be used. If extra columns are required on the face of the form for costing the items separately so that a wider form must be used, it can be satisfactorily handled with any type of continuous forms.

In the case of shipping records, the label and packing slips are generally combined in one form similar in size to the other copies, and it is perforated so that the upper part, which takes the name and address, is torn off and used as the label, while the body of the bill is used as a packing slip for inclusion in the shipment. Care should be taken that the shipper's firm name is printed on the part used as a packing slip when forms are printed.

In this connection it should be noted that even though a considerable proportion of the shipments are made to names or addresses other than those to which the invoice is charged, the label can be satisfactorily handled. The method is to provide two spaces for name and address, the upper one being used for charging directions and the lower for shipping. The label receives only the impression of the lower entry. On those

invoices which are charged and shipped to the same address, only the lower space is filled in on both original and label.

The bills of lading or express receipts are often included in the set of forms. The chief advantage is that the name and address carbonize through to the bill of lading, accomplishing two results:

1. It eliminates writing that part of the bill of lading.
2. It insures the agreement of the two records.

In case the product is sold in standard packages, the body of the bills of lading and express receipts can be filled in at the time of billing, which is an additional saving of time and effort.

In connection with the ledger copy and combinations referred to above, it has been found that in some instances a copy of the invoice can be used as a unit ledger, no other customer's ledger being kept. In such a case the copies of the various invoices are filed until paid when they are removed. Under such a method, the file contains a record of all amounts not paid, represented by the copies of the invoices. This form of ledger copy can, of course, be included in the set of continuous forms In all automatic form feed machine applications the reader should remember that it is possible to add each bill and accumulate the total of the billing.

In many cases it is desirable to file copies of the bills in a binder. If the binder is one that requires slit hole-punching, care must be taken to see that the forms are designed with solid hole-punching with a perforation in the place of the slit. This must be done in order that the forms will not catch on the carbon paper and tear it.

It should also be remembered that all of the above features apply in adapting a combined billing and order writing application to an automatic form feed machine. The copies and the information required on each copy should be determined, and then the mechanical features should be studied to see if it

can be standardized sufficiently to be adaptable to a specific type of automatic form feed machine.

Unit Billing System

Unit Billing System Procedure Explained.—A unit billing system may be defined as that method of billing where original and copies of bills are simultaneously prepared in detail without a charge sheet. Before describing the routine generally used in billing, together with the number of copies which are ordinarily made and the use of each copy, it should be understood that the routine will be the same, regardless of what type of automatic form feed machine is adopted.

Billing department detail varies but slightly, irrespective of the kind of business. It will be found that the following copies of the bill are frequently used. Of course, all of these copies will not be used by every concern, but some of them are used by all concerns. These copies are:

1. Customer's bill
2. Accounting department copy
3. Cost copy
4. Branch office copy
5. Salesman's copy
6. Sales department or statistical copy
7. Statement
8. Commission sheet
9. Sales book copy

After the order has been filled, it is priced and extended, usually by a clerk in the billing department, after which it is ready to be billed. The invoice and the copies above referred to are then prepared. An explanation of each follows.

1. Customer's Bill. This is the bill which is mailed to the customer, showing the goods which have been sold, the quantities of each item, the prices at which the goods were sold, the trade discount, if any, to be deducted, and the total

amount of the sale. Sometimes the bill is rendered in duplicate or triplicate. The original is the primary purpose of billing; all the other copies being secondary, generally for accounting or statistical records of the shipping concern. The bill must be accurate, and the information must be complete, as this is the original record of the sale from which all subsequent records are made.

In this connection some firms, such as railroads, large industrial companies, the United States government, etc., require bills to be rendered on their own special forms. Where this condition exists, they must first be billed on the form used by the firm selling the goods in order to complete its records, and then billed on the special form of the corporation buying the merchandise.

2. Accounting Department Copy. This copy is used as a posting medium to the accounts receivable ledger. It is sometimes called the bookkeeper's copy. It is especially advisable to make a unit copy of the bill to be used in this connection where machine methods of bookkeeping are employed, because unit posting media can be easily sorted to conform to the arrangement of the ledger accounts so as to facilitate rapid posting. Under pen-and-ink bookkeeping this is not so necessary, although even in this case it assists in more rapid posting. However, in spite of this, many firms use some sort of a sales sheet or sales book as a posting medium under pen methods of bookkeeping.

In regard to the control of accuracy, the billing department furnishes a total of the billing for each day when the copies of the bills are turned over to the bookkeepers. This total must be the same as that posted to the customers' accounts in the accounts receivable ledger, and is so entered in the controlling account. It is with this controlling account that the bookkeepers must agree when the trial balance is taken at the end of the month or at lesser intervals. This explains the

advantage in using adding registers to accumulate the total of the day's billing; it shows the tie-up between the two departments. After the posting copies have served their purpose, they are filed for further reference.

3. Cost Copy. A copy of the invoice may be used to figure costs in place of a copy of the order. The same principles apply to it as were stated in the discussion on order writing. In any case, it is used to make up the cost figures on merchandise sales.

4. Branch Office Copy. If a concern maintains branch offices, copies of the bills are usually made for the information of the branch offices having jurisdiction, and sometimes for collection purposes.

5. Salesman's Copy. Some concerns give their salesmen copies of the bills so that they may know what has been billed to their customers. This gives them a record for their own use in figuring commissions.

6. Sales Department or Statistical Copy. This copy is used by the sales department to compile sales records and other necessary statistics, for example, in the total amount of sales made by salesmen; total amount of sales by customers; total amount of sales by territories, etc. The sales can also be classified and subdivided by various classes of merchandise. This copy provides the means for recording this type of information.

7. Statement. There are some lines of business where firms have terms dating 30, 60, or 90 days—sometimes longer. In this case an extra copy of the invoice is prepared to serve as a statement. It is placed in a "tickler" file showing the due date. A few days prior to that date, this copy is mailed as a statement to the customer. This eliminates the making of an extra statement by the accounting department.

8. Commission Sheet. This copy of the bill is used by the department which keeps salesmen's commission records. It is used for figuring commission and also as a posting medium to the accounts of the salesmen. The relation of the commission copy to these records is the same as that of the accounting department copy to the accounts receivable records. There may be further adjustment necessary in case the salesmen are paid on the basis of cash received from customers, but it is the general practice to credit them with the sales as they are billed, and only make adjustments in case the sale is cancelled or not paid for, or part of the goods are returned.

9. Sales Book Copy. This copy is very similar to the order register copy as explained in order writing. Many concerns at present use a sales sheet or sales book which has only skeleton information in connection with each sale. However, the advisability of using a unit copy which is bound in numerical order is becoming more and more generally recognized. It is just as convenient a record and gives more information in that it is a complete copy of the bill.

An illustration of a condition in which a large number of extra copies of the bill are required is that of firms which export merchandise. Because of export requirements, a number of copies of the bill must be sent to the customer and to the agent who is forwarding the shipment; there must be a customer's declaration signed by the consul of the country into which it is being shipped; a certificate of origin, etc. This is brought to the attention of the reader, because such conditions are encountered in the billing routine of a concern that has considerable foreign trade, and care should be taken to adopt the machine that will best handle the condition.

Use of Vertical Adding Units.—Descriptive writing equipment with adding registers is especially adaptable to billing. The general method is to use two registers—one an items register, the other a total register. The items register auto-

matically adds the amount of each item on the bill as it is written. The same key stroke which writes the amount adds in the register. This feature prevails with all types of descriptive writing machines applied to billing and order writing applications with the exception of the typewriter. To illustrate, when the bill is completed we have a total in the items register, which is the total of the bill. From it, in case of discounts, the discount may be subtracted. This net total is then copied in the total column which automatically adds in the total register. The advantage of the items register is that it totals the bill, automatically proving the addition on the medium from which it was copied; in other words, partially audits the bill, proving that it was both copied and added correctly.

The total register is not cleared during the duration of the billing operation but accumulates each total as written so that at the end of the day it has automatically figured the total billing for that day. This total of these copies establishes the control figure for the bookkeeping department. The advantage of the adding unit in this connection is obvious.

Due to the requirements of different businesses, other adding units are sometimes very necessary. The most common unit is one used as a quantity register, either to accumulate the quantity of the article billed, or to add quantities for each bill. Usually this is only applicable where one kind of product is handled. There are times when additional registers may be used to advantage. Some firms have two or more amount columns for different classes of goods. In such cases, registers over certain columns can be used to accumulate totals by classes.

Advantages of Unit Method of Billing.—The advantages of the unit method of billing are as follows:

1. It is faster than other methods.
2. It is more flexible than any other system.

The flexibility referred to in the second advantage just mentioned is that it permits different sizes for the different copies of the bill, according to their use. It allows the unit copy to be bound for the permanent sales book in any arrangement desired. This binder can be arranged numerically, by territories, by salesmen, etc. The unit method also allows combinations to be made, such as using a card as one of the copies. In some cases, the ledger sheet is inserted so that it receives the charge for goods in detail and must agree with the bill without extra writing or checking. This is used particularly in some classes of installment houses where the charges are few and of large amount, and credits are small in amount and numerous.

Condensed Billing System

Condensed Billing System Defined.—Condensed billing may be defined as that method of billing which combines a large sales sheet with the bill and copies. This is also called the "bill and charge," or "bill and sales sheet" system. The method employed is to assemble the unit copies of the bill with the sales sheet, so that a carbon impression of the bill is made on this sales sheet or sales journal, as it is often referred to. The next invoice is assembled and inserted so that the carbon impression will fall immediately beneath that of the previous bill. In this manner the sales sheet will contain copies of 6 or 8 individual invoices. Thus a chronological loose-leaf book or sales journal is made which is used for reference purposes.

Advantages of Condensed Billing Method.—The advantage claimed for condensed billing is that the sales sheet is a more condensed record, and therefore, requires less filing space and is an easier means of reference. It is extremely popular in certain lines of business, because it is an old established method and has stood the test of time. It is more often used where the average number of items per invoice are few.

Condensed billing is not so fast as unit billing. The sales

book made up from these sales sheets is not so flexible a record as that made up from unit copies of the invoice, because under the latter method the copies can be sorted in any desired classification. Its advantage of requiring less filing space and being a more condensed record is more apparent than real. It has been found that the unit copy sales book is more desirable and equally as convenient for reference.

Sales Distribution.—One condition where the sales sheet is advantageous is where a sales distribution is involved. "Sales distribution" means the division of sales into classes. For example, a coal dealer may wish to know his sales of nut, egg, pea, stove, and soft coal. Under the columnar method of distribution he will provide five columns, one for each classification, and will enter the amount of the sale by pen or machine in the correct column. Then at the end of the day the total of each column will give him the sales of respective classes. If the application requires distribution by the columnar method at the time of billing, it is very desirable to use the type of equipment that will best handle a condition of condensed billing with distribution columns on the sales sheet. In this case, after the bill is written the amount is distributed into the correct distribution column by machine.

Decimal tabulation with which all machines used in this class of work are equipped, affords very easy and quick line writing positions, and if desired, adding registers or totalizers may be so arranged as to accumulate the total for each classification, which will eliminate the necessity of totaling these columns at a separate operation. The amount of the total register, which is the total billing for the day, should prove against the totals of these distribution registers.

Combined Billing and Order Writing System

Practicability of Method.—Having studied the methods of writing orders and bills separately, the reader will now con-

sider the conditions under which these two operations can be combined. It is obvious that in most cases the same information which appears on the order must also appear on the bill, with the addition of the pricing. It is practicable, where conditions are favorable, to write both records at the same time, thereby saving the labor of writing and checking them separately, and also insuring their agreement.

Where Method is Not Practicable.—The condition which makes it impossible to combine the bill and the order is where a considerable portion of the orders require part shipments. For instance, an order may come in for 100 pieces of merchandise, 10 to be delivered each week until the order is filled. If this were the usual condition, it is easy to see that combining the bill with the order would be impracticable. If, however, there are not too many part shipments, the combination of the bill with the order can usually be made. For the purpose of illustration, a simple case will be explained.

Factors Governing Combined Bill and Order Writing Method.—Assuming that all orders are shipped complete, and that the prices are known at the time the order is received, it is a very easy matter to write the bill and the order. The only information which need be filled in afterwards is the date of the shipment and the date of the bill. If this is known at the time the order is received, it can also be filled in. If the merchandise is standard, the shipping weights will also be known and the shipping record with weights, etc., can be completed.

Let us assume that the prices are known, but the shipments are not always complete. However, if it is known which items can be shipped and which cannot, the bill and order can be written, priced, and extended complete, with appropriate notations opposite the items which cannot be shipped, or which will be shipped at a later date.

There are several means of knowing which items can or cannot be shipped. Some concerns regularly keep certain items

in stock and certain items are made to order. The clerks engaged in billing will be informed of this. In other cases a firm will keep sufficient quantities of all the merchandise they handle in stock in order to be able to fill completely their orders as received. In other cases, they have a sufficiently accurate and up-to-date stock control so that they are able to tell which items are in stock and which are not. This latter condition would necessitate passing all orders through the hands of a stock clerk who would make notations as to the merchandise that can be shipped. Without accurate knowledge of the merchandise which is to be shipped, the bill and order cannot be extended at the same time, but it is possible to write both the records and extend the bills later.

In the last case mentioned above, the condition is dealt with in the following manner. When the order is received, the items are entered on both the bill and the order. A copy of the order is sent to the shipping department, and when the goods are shipped, the shipping clerk notes on his copy the exact quantities and items shipped, together with the date and any transportation charges. In the meantime, copies of the bill have been filed in the office. When the shipping copy is returned to the office with notations, it is matched up with the various other copies of the bill, which are then inserted in the machine again, and the items which have been shipped are priced and extended, the date of shipment and transportation information filled in, after which the bill is complete for mailing to the customer. This extension is a separate operation, but the second operation is not nearly so laborious as if the entire bill had to be written.

Where the quantity shipped frequently varies from the quantity ordered, two columns should be provided on the forms —one for "quantity ordered," and one for "quantity shipped." The first column is filled in when the order is written, and the second where the quantity shipped varies.

When the order is not shipped complete, a back order, or in

other words, a complete new bill and order set, is written up for the unshipped items. This method of back ordering must be used when the bill and order are combined. If any other method of back ordering is used, the combination of the bill and order is not possible.

Use of Automatic Form Feed Machines.—Combined bill and order writing is very frequently done on automatic form feed machines. It is one of the best combinations of any, because it requires the writing of the least possible number of operations and can be performed on such devices in a minimum of time.

System Survey of Customers' Order Writing and Billing Routine.—Where the introduction of scientific order writing and billing systems involving the use of improved mechanical record writing equipment is contemplated, a few remarks in connection therewith are deemed necessary if desirable results are to be obtained. Before any installation of mechanical record writing machines is made, the underlying purpose of each element in the routine concerned should be examined so as to bring each and every activity of the system under proper control. Thus, in inspecting any routine, its relation to the preceding and succeeding routines and the methods by which its operations are performed and controlled, should be carefully studied. Since the scope of such surveys varies in a large degree, depending on the conditions or requirements existing, it is only possible to suggest certain normal lines of investigation. The individual making the survey should always be on the alert for possibilities of increasing efficiency in operative routine methods. The matter of office heat, light, and ventilation is so important from the standpoint of efficiency in clerical workers, that it should require special attention. The general arrangement of the department where mechanical accounting machines are to be used, should be examined very closely with a view of obtaining maximum production from

such equipment as continuously as possible. Much time and money are often wasted in the handling of media before and after machine operation, due to the limited knowledge of the machines' flexibility in handling the condition to which they are to be applied.

The average and maximum efficiency of the mechanical accounting machine contemplated for use should be ascertained. This latter point is often important in arranging and preparing details for the establishment of standards for machine operators in routine procedures. If a standard for machine production is to be used in routines involving great handling of media, the examination should be unusually detailed and thorough.

The number of male and female clerical workers occupied in the routine under examination wherein mechanical equipment is to be used, should also be noted. The entire clerical force of the system should be classified in this way, according to sex, salaries, and class of work performed. The wages paid is a matter that demands special consideration, as it may make considerable difference in the setting of operators' standards and incentives. Particular care should be taken to note all classes of work that show a tendency of having been performed in a half-hearted manner. Such routines demand attention and perhaps special measures for the correction of the existing inefficiency.

It is also suggested that the individual making the survey have with him a schedule of questions similar to those given below which will serve both to classify his information and to keep him from overlooking more or less important routine details. While the schedules of questions which follow are suitable for this purpose, they should not be considered as complete for every possible phase of order writing and billing routine condition that may be encountered. The examiner may, nevertheless, be able to cover the greater portion of the investigation by use of these queries and instructions, and to sup-

plement them wherever necessary. It must always be remembered that too much information cannot be obtained, and nothing pertaining to the specific routine or method is too unimportant to inspect and study.

Order Writing and Billing Routine Analysis

Customer's Order Writing Routine:

1. Ascertain how distribution is made.
   - (a) Through retailer.
   - (b) Jobber, wholesaler, or distributor.
   - (c) Direct.
     - (1) Branch offices.
     - (2) Individual selling agents.
     - (3) Mail order.
     - (4) Retailing.
2. If any branch warehouses, offices, or agencies are maintained, how are orders handled?
3. Are orders written by any of the above (in 2)?
4. If mail order business, ascertain order routine.
5. If goods are sold at retail, how are orders handled?
6. Are all orders written in one department?
   - (a) If not, ascertain departments.
   - (b) Would it prove to advantage to centralize the work?
7. Ascertain average number of orders written per month.

   Note: To secure the average number of orders per month use as a basis the number of orders for a slack month and for the most active month in the year.
   - (a) Number of working days per average month.
   - (b) Number of orders written per day per average month.
8. How are orders written?
   - (a) By hand?
   - (b) If by machine, ascertain make and type of equipment.
9. Ascertain average number of items per order.

   Note: To secure the average number of items per order consider as a basis the number of items on the first 50 orders in both months used in answering seventh question above. An item is a single detail on an order such as the date, order number, etc.

10. How are orders received? Give percentage.
    (a) Through mail?
    (b) By telephone?
    (c) Through salesman?
    (d) Other sources?
11. Are orders received by order writers evenly throughout day?
12. How many copies are made of orders?
    (a) Are they all made in one operation?
    (b) How are orders distributed?
    (c) Obtain names of departments receiving copies and number required by each.
13. How many persons are employed in order writing?
    (a) Male.
    (b) Female.
14. What are the total salaries paid?
    (a) Male.
    (b) Female.
15. Do order writers devote entire time to order writing?
    (a) If not, obtain reason, and what work they are required to perform when not on order writing.
    (b) Ascertain the approximate number of hours order writers work on orders.
    (c) Ascertain the approximate number of hours order writers are required to devote to work other than order writing.
    (d) If order writers are engaged the entire day, are clerks other than order writers used on orders?
    (e) How many persons are thus employed?
        (1) Male.
        (2) Female.
    (f) What are the total salaries paid for this additional assistance?
        (1) Male.
        (2) Female.
16. Is it possible for prices to be entered and items extended when order is copied?
17. Is the original order priced?
    (a) Ascertain where and by whom order is priced.
        (1) Department.
        (2) Individual.

18. Are extensions made on original order?
    (a) Ascertain who makes extension on order.
    (b) How is extension made?
        (1) Mentally?
        (2) If by machine, ascertain make and type of equipment.
19. If the original order is priced and extended are the amounts typed on all department copies?
20. If not, ascertain what department copies do not show extended amounts, and any other difference.
21. Are prices and extensions checked before orders leave department in which they are handled?
    (a) By whom?
    (b) Mentally?
    (c) If by machine, ascertain make and type of equipment.
22. Are all orders proofread before leaving the department?
    (a) Do order writers perform this work?
    (b) If not performed by order writers, are special clerks employed, and how many?
        (1) Male. Number of hours per day.
        (2) Female. Number of hours per day.
    (c) What are the total salaries paid for this class of work?
        (1) Male.
        (2) Female.
    (d) How many persons are required to do work other than order writing and proofreading?
        (1) Male. Number of hours per day.
        (2) Female. Number of hours per day.
    (e) What are the total salaries paid for this class of work?
        (1) Male.
        (2) Female.
23. Ascertain whether any part of order is recopied.
    (a) If so, for what purpose?
24. Ascertain whether a positive check is maintained on the number of:
    (a) Orders received.
    (b) Orders filled.
    (c) Orders unfilled.
    (d) Orders billed.
25. Ascertain method of check employed.

26. Is order acknowledged to customer?
    (a) In what form?
27. Is a permanent order register or other record made?
    (a) Ascertain in what department and by whom this record is made.
    (b) When is it prepared?
    (c) Is it a pen-kept record?
    (d) Bound book or loose-leaf?
28. Is any analysis of orders made in that department (27)?
    (a) How classified?
    (b) Ascertain full descriptions.
    (c) If no analysis is made would it be possible or desirable?
29. Are all orders shipped complete?
    (a) If not, ascertain per cent of orders shipped complete.
    (b) If quantity shipped varies from quantity ordered, how is this variation cared for?
    (c) If a back order is prepared, state when and how handled.
30. Are labels and packing slips used?
    (a) How prepared?
        (1) By hand?
        (2) If by machine, ascertain make and model used.
31. Ascertain whether shipments are made from:
    (a) Local stock.
    (b) Factory.
    (c) Or both.
32. Ascertain whether cost price is entered on the order.
    (a) In what department?
    (b) By whom?
33. If cost price is entered, is any verification made as to correctness?
    (a) By whom?
    (b) How?
34. Is a notice of shipment sent to customer?
    (a) In what form?
35. Does the credit department keep a record of all orders?
    (a) If so, ascertain what this record consists of.
    (b) When is this record prepared?
        (1) Pen-kept?

(2) If by machine, ascertain make and type of equipment.

36. Does the credit department keep a record of all shipments?
    (a) If so, ascertain what this record consists of.
    (b) When is this record prepared?
        (1) Pen-kept?
        (2) If by machine, ascertain make and type of equipment.
37. Could orders be written with the improved type of automatic feed machine?
    (a) If not, why?
38. Ascertain whether order and bill could be prepared simultaneously in one operation.
    (a) If not, why?
39. Obtain copies of forms and records used with complete entries.
40. Note any additional information that may prove helpful.

II. Billing Routine:

1. Ascertain manner of selling product.
    (a) Through retailer?
    (b) Jobber, wholesaler, or distributor?
    (c) Direct?
        (1) Branch offices.
        (2) Individual selling agents.
        (3) Mail order.
        (4) Retailing.
2. Are sales evenly distributed over the year, or seasonally?
3. What are the active seasons?
4. If any branch warehouses, offices, or agencies are maintained, how is billing handled?
5. If mail order business, ascertain billing routine maintained.
6. If goods are sold at retail, how is billing handled?
7. What is the nature of the billing media?
8. Are such billing media received in billing department evenly throughout the day?
9. Ascertain average number of bills prepared per month.

   Note: To secure average number of bills per month use as basis the number of bills for a slack month and the most active month in the year.

(a) Number of working days per average month.
(b) Number of bills written per day during average month.

10. How are bills written?
    (a) By hand?
    (b) If by machine, ascertain make and type of equipment.
    (c) Is bill prepared simultaneously when customer's order is written?
    (d) Can order writing and billing applications be combined? If not, why?

11. Ascertain the average number of items per bill.
    Note: To secure the average number of items per bill consider as a basis the number of items on first 50 bills in both months used in answering ninth question above.

12. Ascertain number of copies made.
    (a) Are they made in one operation?
    (b) Ascertain names of departments receiving copies.

13. Is a continuous sales record made when bill is written?
    (a) Is such a record prepared at a separate operation?
    (b) By hand?
    (c) If by machine, ascertain make and type of equipment.

14. How many male and female billers are employed?

15. What are the total salaries paid to each group?

16. Do billers devote entire time to billing?
    (a) If not, ascertain what work they are required to perform when not billing.
    (b) Ascertain the approximate number of hours billers work on bills.
    (c) Ascertain the approximate number of hours billers are required to devote to work other than billing.
    (d) If billers are engaged the entire day, are clerks other than billers used on bills?
    (e) How many persons are thus employed?
        (1) Male. Number of hours per day.
        (2) Female. Number of hours per day.
    (f) What are the total salaries paid for this additional assistance?
        (1) Male.
        (2) Female.

17. Ascertain whether items are extended before or at the time of billing.
    (a) Are billers required to do extending?
    (b) If not, who makes extensions?
    (c) How are extensions made?
        (1) Mentally?
        (2) If by machine, ascertain make and type.
        (3) How many persons are employed on this work?
            a. Male. Number of hours per day.
            b. Female. Number of hours per day.
    (d) How are extensions checked?
        (1) Mentally?
        (2) If by machine, ascertain make and type.
    (e) Are bills checked after writing?
        (1) Are bills proofread with order?
        (2) Do billers perform this work?
            a. How many are assigned to such duties? (i) Male. Number of hours per day; (ii) Female. Number of hours per day.
            b. If billers are not engaged in this sort of work, are clerks other than billers assigned to it?
            c. If so, how many persons are thus employed? (i) Male. Number of hours per day; (ii) Female. Number of hours per day.
            d. What are the total salaries paid persons thus engaged? (i) Male; (ii) Female.
18. Is there a positive check on the daily grand total of sales covered by bills written?
19. How many complaints or adjustments from customers are received per month due to errors in bills?
20. Is an adjustment report maintained?
21. Is a summary prepared classifying adjustments?
22. What seems to be the biggest trouble in not acquiring production?
23. Could bills be written on an automatic feed machine?
    (a) If not, why?
24. Would writing bill, sales, journal, and posting ledgers with statement in one operation be considered?
    (a) If not, ascertain reasons.

25. Are the bills sent to customers from billing department?
    (a) If not, ascertain to what department they are sent, and reasons therefor.
26. Has there been any delay in sending bills to customers?
    (a) Has such delay existed in billing department?
    (b) Elsewhere?
    (c) Ascertain reasons.
27. Is any part of bill recopied?
    (a) If so, for what purpose?
    (b) Has the recopying of bills been the cause of delay in sending bills to customers?
    (c) If so, ascertain reasons.
28. Are bills sent to credit department for credit approval?
    (a) Has there been any delay in approving bills before mailing?
29. Obtain copies of forms and records used with complete entries.
30. Note any additional information that may prove helpful.

CHAPTER V

ACCOUNTS RECEIVABLE SYSTEMS

General Considerations and Factor Involved in Accounts Receivable Systems.—In the preceding chapter, conditions in order writing and billing applications were dealt with from the scientific production viewpoint. In this chapter general considerations and factors involved in the application of mechanical accounting equipment to bookkeeping conditions such as the simple accounts receivable routine will be discussed.

Building systems around mechanical accounting equipment to handle most effectively the accounting condition being dealt with is a very important factor. It is this logical method, so widely accepted as correct in theory which is too frequently overlooked or only partially utilized when accounting methods as applied to an accounts receivable routine are changed from pen to machine. Should the reader be engaged in constructive mechanical accounting work, he needs little reminder concerning the wide variation that exists in the two so-called "orthodox" methods usually adopted in accounts receivable routines. However, for the benefit of those who have but a vague idea of the accounting composition of the "orthodox" methods referred to, some of the fundamental factors that require careful consideration when developing the design layout of an ideal accounting machine system of accounts receivable will be pointed out. To illustrate better the various problems to be solved and to interpret the principles involved, there are presented specific conditions as to why a customer's record is brought into existence and what data it should furnish.

Factors That Need Consideration.—It is universally conceded that an ideal accounts receivable ledger should furnish in readily available form the following information:

1. Each bill of goods sold each customer with date and amount.
2. Each merchandise return or payment made with date and amount.
3. Balance each customer owes.
4. Total balance outstanding on the customer's ledger.
5. Total customer has purchased each month.
6. Total merchandise returned each month, and total customer has paid each month.
7. Balance past due.
8. Items in detail which customer has purchased.
9. Amount of business each salesman's territory produces.
   (a) Total sales.
   (b) Total collections.
   (c) Total outstanding.
10. Kinds of products sold and the entire line of trade analyzed.
11. Sales information by kinds of products classified on each costumer's ledger sheet.

Every experienced accountant knows that not all of these requirements can be supplied under ordinary methods by any one accounts receivable ledger, and that not all of these items can be made equally available except at prohibitive expense. For instance, if the balance the customer owes is to be mechanically determined each time a posting is made, it is impossible for any standard accounting machine to compute at the same time the total which the customer has purchased to date and the total he has paid to date. If this computation is deemed necessary in addition to the computation of the balance, it must be made at a separate operation. Because this is so, it is quite essential to ascertain the requirements of the accounting condition being dealt with and adopt an application that follows good accounting practice.

Factors 1 to 4. These cover information which all accounting machines are capable of developing in more or less degree. It has always been conceded that the prime purpose

of any system of customers' accounts, whether maintained by pen or machine, is to bring about a condition of efficient collection. If this is true, it follows that a knowledge of what the customer's indebtedness is at all times, is quite essential. In view of the fact that it is desirable to send out customers' monthly statements at the earliest moment in order that collections may be effected promptly, a statement, ledger and proof of posting, made at one operation, is advocated in most systems where mechanical accounting equipment is contemplated. By computing the "balance" after every posting, the accounting department is able to procure a quick trial balance, and to know each day the total balance outstanding on the customers' ledgers (Figure 4).

Accountants, however, have been too prone to insist upon having the accounting machine prepare an entry on the statement and ledger at one operation under all conditions. If the accounting condition is one where statements are written to best advantage at a separate operation because of unusual requirements, that should be adopted if the preparation of the statements is not unduly delayed, and especially if it also proves more desirable from the standpoint of the customer receiving the statement.

In an orthodox routine of "skeleton" statement, ledger, proof of posting, and control sheet involving the use of cylindrical-writing or printing platen equipment, the statement, ledger, and proof of posting are written at one operation. The control sheet, to which is posted the totals of each day's machined proof, is kept by pen. The balance indicated on a control sheet is the known predetermined control figure, which represents the balance outstanding, and is the figure with which the trial balance of the customers' ledgers must agree. This application can be performed on all machines of the cylindrical platen as well as the flat platen types of descriptive writing and printing accounting machines.

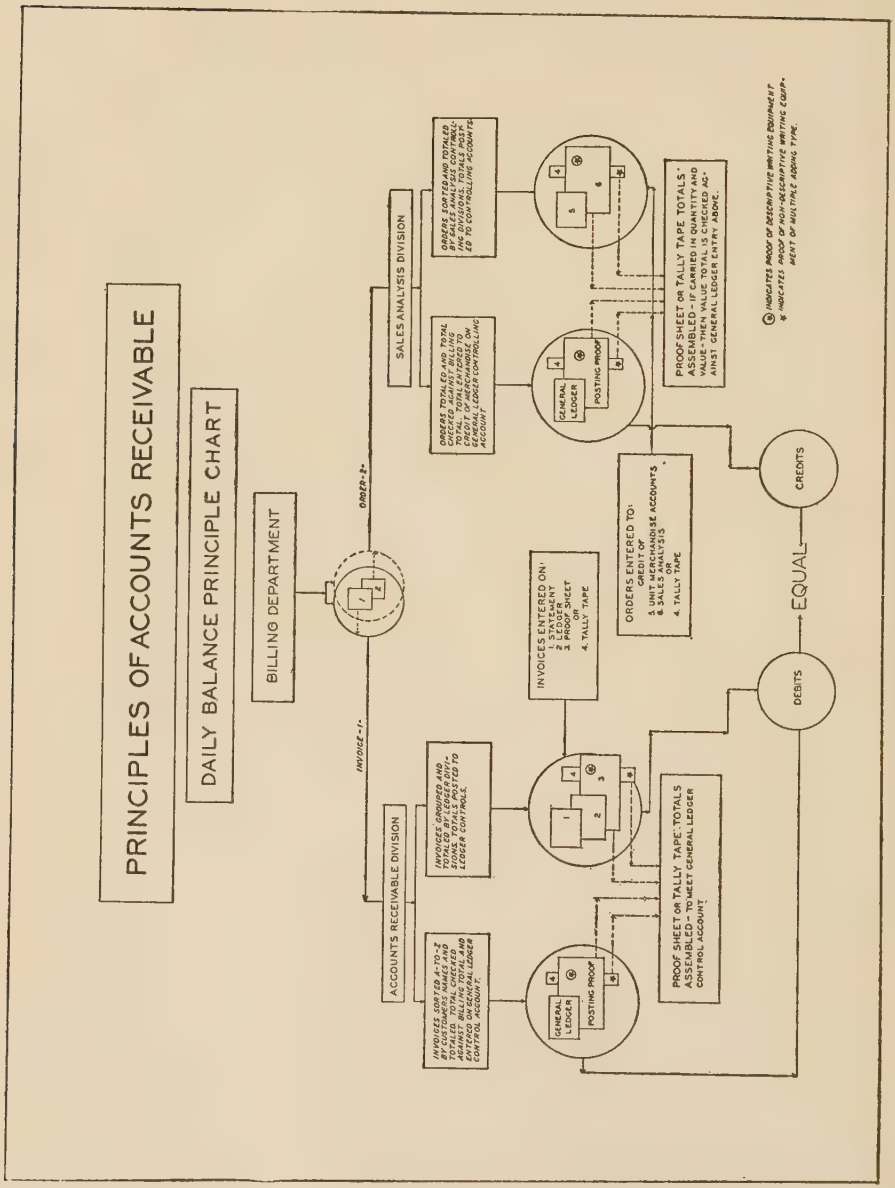

PRINCIPLES OF ACCOUNTS RECEIVABLE
DAILY BALANCE PRINCIPLE CHART
BILLING DEPARTMENT
INVOICE-1-
ORDER-2-
ACCOUNTS RECEIVABLE DIVISION
SALES ANALYSIS DIVISION
INVOICES SORTED A-TO-Z AND PROOF SHEETS ARE TOTALED. TOTAL CHECKED AGAINST BILLING TOTAL AND ENTERED TO GENERAL LEDGER CONTROL ACCOUNT.
INVOICES GROUPED AND TOTALED BY LEDGER DIVISIONS. TOTALS POSTED TO LEDGER CONTROLS.
ORDERS TOTALED AND TOTAL CHECKED AGAINST BILLING TOTAL. TOTAL ENTERED TO CREDIT GENERAL LEDGER CONTROLLING ACCOUNT
ORDERS EXTENDED TOTALED BY SALES ANALYSIS AND GROUPED ACCORDING TO LEDGER DIVISIONS. TOTALS POSTED TO CONTROLLING ACCOUNTS
GENERAL LEDGER
POSTING PROOF
INVOICES ENTERED ON:
1. STATEMENT
2. LEDGER
3. PROOF SHEET
OR
4. TALLY TAPE
ORDERS ENTERED TO:
CREDIT OF
1. UNIT MERCHANDISE ACCOUNTS
& SALES ANALYSIS
4. TALLY TAPE
PROOF SHEET OR TALLY TAPE TOTALS ASSEMBLED - TO MEET GENERAL LEDGER CONTROL ACCOUNT
PROOF SHEET OR TALLY TAPE TOTALS ASSEMBLED - IF CARRIED IN QUANTITY AND VALUE - THEN VALUE TOTAL IS CHECKED AGAINST GENERAL LEDGER ENTRY ABOVE.
DEBITS
EQUAL
CREDITS
(1) INDICATES PROOF OF DESCRIPTIVE WRITING EQUIPMENT
(4) INDICATES PROOF OF NON-DESCRIPTIVE WRITING EQUIPMENT OR MULTIPLE ADDING TYPE.

Figure 4. Routine Chart Illustrating Daily Balance Principle

FACTORS 5 AND 6. "Total customer has purchased each month," and "Total merchandise returned each month and total customer has paid each month." These items may be cared for satisfactorily as will be noted below. Forms may be easily designed for the machine computation of total charges and total credits instead of outstanding balances. The routine in which these forms are used is shown in Figure 5. The customer's statement under this method must be closed at the end of the month and at the same operation. A form used as a posting proof may also serve as the sales manager's monthly report of accounts receivable. Since this posting proof or sales manager's monthly report of accounts receivable is usually prepared at a separate operation under pen methods, it can hardly be said that the closing of the monthly statements involves any extra work. This system may be advocated where similar sales department requirements exist, and the procedure may be adopted by companies which desire to furnish their collection departments with a list of outstanding accounts without additional effort. Where objection arises to exhibiting balances on customer's statement after each posting, this system is recommended.

FACTOR 7. "Balance past due." This may be cared for by providing at the head of the statement a space for the analysis of all past due items. This feature makes the statement easily read when the customer analyzes it to ascertain the amount in arrears. In cases where a carbon copy of the statement is prepared for the collection department, such information is valuable.

FACTOR 8. "Items in detail which customer has purchased." This is a condition that can only be cared for on descriptive writing accounting machines. Itemized ledgers are found in many manufacturing concerns and are not uncommon in department stores, in which it is the custom to prepare an itemized invoice, monthly statement, ledger, and posting proof at one

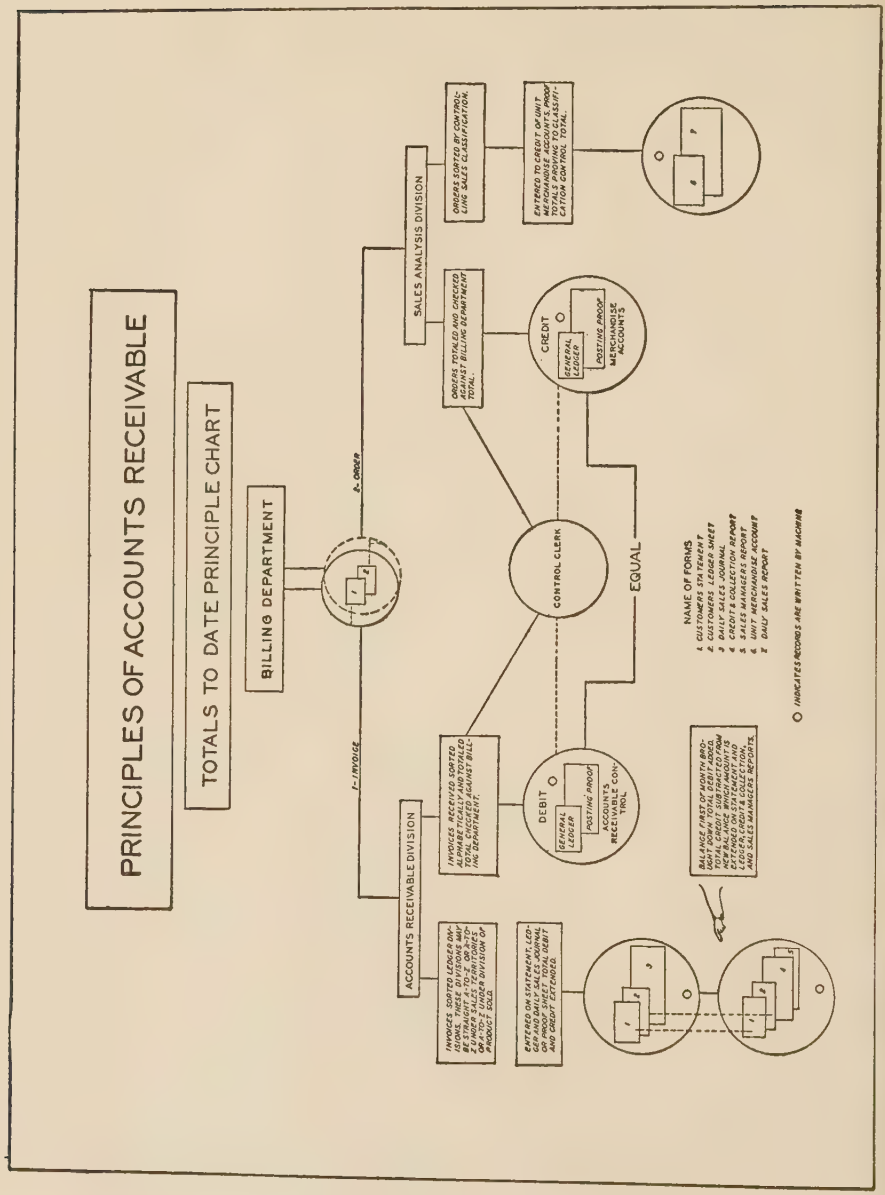

PRINCIPLES OF ACCOUNTS RECEIVABLE
TOTALS TO DATE PRINCIPLE CHART
BILLING DEPARTMENT
A-ORDER
I-INVOICE
ACCOUNTS RECEIVABLE DIVISION
SALES ANALYSIS DIVISION
INVOICES SORTED ON CUSTOMERS NAME AND RESTRAIGHT A TO Z OR A TO Z UNDER DIVISION OF PRODUCT SOLD.
INVOICES RECEIVED SORTED ALPHABETICALLY AND TOTAL CHECKED AGAINST BILLING DEPARTMENT.
ORDERS TOTALED AND CHECKED AGAINST BILLING DEPARTMENT TOTAL
ORDERS SORTED BY CONTROLLING SALES CLASSIFICATION.
ENTERED ON STATEMENT, LEDGER AND DAILY SALES JOURNAL OR DAILY CASH RECEIPTS DEBIT AND CREDIT CITCHOED.
DEBIT
GENERAL LEDGER
POSTING PROOF
ACCOUNTS RECEIVABLE CONTROL
CONTROL CLERK
CREDIT
GENERAL LEDGER
POSTING PROOF
MERCHANDISE ACCOUNTS
EQUAL
ENTERED TO CREDIT OF UNIT MERCHANDISE ACCOUNTS TOTALS PROVING TO CLASSIFICATION CONTROL TOTAL.
BALANCE FIRST OF MONTH BROUGHT FORWARD, CHARGES AND TOTAL CREDIT SUBTRACTED FROM TOTAL DEBIT, BALANCE THEN EXTENDED ON STATEMENT AND LEDGER CARD, CREDIT TOTALS AND SALES MANAGERS REPORTS.
NAME OF FORMS
4 CUSTOMERS STATEMENT
2 CUSTOMERS LEDGER SHEET
3 DAILY SALES JOURNAL
4 CREDITS COLLECTION REPORT
5 SALES MANAGERS REPORT
6 UNIT SALES ACCOUNT
7 DAILY SALES REPORT
O INDICATES RECORDS ARE WRITTEN BY MACHINE

Figure 5. Routine Chart Illustrating Totals to Date Principle

operation, extending a balance after each posting. This procedure is feasible only when routine conditions are right.

Combined Billing and Ledger Posting Performed Simultaneously. The consolidation into one operation of the billing and ledger posting applications is often found practicable. This application is called the "detail plan," and its chief feature is the centralization of the responsibility of accuracy by a combined billing and ledger posting operation, which keeps the ledger posting work up to date and eliminates the trouble often found in the small concern of allowing such work to fall behind while the billing is done daily. Another feature of this plan is that the placement of the complete details of an account in one record instead of having it in several auxiliary books affords an easier and more comprehensive analysis for either credit or collection purposes. This method also simplifies and speeds up the crediting of materials returned. It aids collections and avoids complaints of lost bills because the statements contain every entry. It eliminates as well, requests from customers for bills or itemized statements which often delay payment of accounts. It simplifies locating full information when orders read "Same as last" or "Duplicate preceding shipment." It reduces the actual number of operations, thereby taking less time to record the entries. It saves space, either where duplicate bills have been used, or where a sales book has been kept and finally it reduces the chances of making mistakes when billing and posting functions are performed at separate operations.

In every line of business to which the "detail plan" can be applied, some accounts will be found more active than others; that is, sales are made in a greater number of items. The reader may feel that the plan does not or cannot be used because of these accounts. However, such accounts are usually in the minority, and generally do not exceed 5% or 10% of the whole. Where the "detail plan" can be worked on approximately 90% or more of the accounts, it is unwise to permit the exceptions

to alter completely the operative accounting methods that would normally be adopted.

In exceptionally active accounts having a great number of items, the following solution has been found practical. If a customer purchases 50 items at one time, it takes 50 lines on the ledger sheet. If he purchases 5 items on ten different dates, it also only requires 50 lines on the ledger sheet. Of course, exception is often taken to this by the management, who will paint a picture of the condition black enough to convince the one making the installation that the same account may purchase, and does purchase 50-item bills several times in the same month, but investigations of past records have generally shown that the conditions are not as serious as they are usually portrayed.

In one unusual installation, the authors found it necessary to handle the exceptional accounts by a special method. There were only 10 in about 800 accounts different from the others, but bills with 100 items on each were found applicable to those 10 accounts. To meet this condition, the exceptional accounts referred to were billed separately, a copy of the invoice was stuffed into the ledger with the other billing media, and when these exceptional accounts were reached, the date and amount only were posted to those accounts.

Experience has proved that on accounts which show bills for merchandise of 40 or 50 items, the same customers do not receive another bill in perhaps two or three months, containing a similar number of items, but they may and often do receive a half-dozen bills between the large bills containing one or more items.

One objection raised to the detail plan is that the management has visions of a ledger several feet in thickness. Comparing the square inches of paper surface with either the duplicate bills or sales books required under the same conditions the detail plan effects a saving for the following reason. If a duplicate of the invoice was formerly used, about half

of one side contains the address and description of goods, while the balance as well as the reverse side is blank. Where a sales book has been used, it will invariably show that at least 50% of the space contains names and addresses, while the ledger under the detail plan carries the name but once at the top, and on the right-hand side as proof of posting, the name at the same time carbonizing onto the proof sheet. The proof of posting becomes of double importance as a proof of billing of all items and posting of all bills.

Machine Additions of Billing Media. Another feature worth mentioning is the use of a unit adding or items register or totalizer for bill items with which flat platen and cylindrical-writing machines may be equipped. This register or totalizer is of great importance because it checks the addition of every invoice before the extension is made into the charge column of bill, statement, ledger, and proof sheet simultaneously, and is a means for disclosing an error made on the original order as far as additions are concerned. Without exception, it has shown marked advantage in ledger posting under the detail plan. Even though there is a positive and double check of the additions on the billing media, the savings effected by this register have been considerable enough to warrant its general adoption. This has been demonstrated more clearly in the small business where billing was formerly performed either by hand or typewriter.

To illustrate this point more clearly, take the familiar example of a pen-kept system, where the shipping orders are being returned to the office to be billed so that invoices can accompany the goods. The shipping orders cannot all be held and proved at one time to establish a predetermined total against which the billing must check. So the bills are prepared one or two at a time, and the proof is lost, even though prices, extensions, and additions are checked.

Predetermination of Totals. The importance of a predetermined total of charges or credits before posting to the ledger

has been demonstrated so many times in the application of mechanical accounting equipment that the authors advocate that method of control, whether from order to bill and from bill to ledger, or direct from order to ledger. Under the pen or typewriter method this is not usually done, and when these conditions are being dealt with, especially in a routine requiring bills to be sent with the goods, care should be taken against the possibility of errors.

Use of Split Platen Machines. Should it be desirable that a skeleton statement and ledger be prepared, billing be performed on the same machine, and posting be made during the process of billing, a split flat platen descriptive writing accounting machine may be obtained, and used effectively. One side of the writing platen may be equipped for automatic form feed billing, and the other side devoted to straight statement and ledger posting. In such applications the usual procedure followed is: After each unit bill is prepared, the machine operator immediately posts the amount of the charge, as shown by the total amount of invoice to the respective customer's statement and ledger sheet. This application is only adaptable where the billing volume is not large.

Factor 9. "Amount of business each salesman's territory produces (a) total sales, (b) total collections, (c) total outstanding." Machines that are capable of performing work of this nature in connection with posting customers' accounts must be able to prepare, in the process of machine operation, a proof of posting exhibiting on a carbonized record all descriptive matter of every posting made. The most convenient approach to handling a condition of this nature most satisfactorily would be to arrange customers' accounts geographically according to salesmen's territories. Before posting is begun, all copies of invoices that are used as posting media are required to be sorted alphabetically by customers' names according to salesmen's territories, and a separate run of post-

ings made for the business coming from each salesman's territory. The proof of posting sheets, therefore, will serve as journals of salesmen's sales, and will exhibit the total sales from each salesman's territory. Customers' remittances are handled in the same manner, so that the total collections properly classified may be used as a basis for figuring salesmen's commissions on paid sales.

Under this plan a control sheet for each ledger division is maintained, the accounts are arranged according to salesmen's territories, and each binder control will establish the total outstanding receivables in a salesman's territory. It is apparent that the results demanded by factor 9 are easily accomplished if approached from the angle mentioned. The proof of posting sheet developed during the process of posting may be ruled and printed to look more like a permanent record than a plain, unprinted piece of paper.

Factor 10. "Kinds of products sold and the entire line of trade analyzed." Few accounting machines are capable of producing these data during the process of posting customers' accounts. Certain types of printing equipment of the cylindrical and flat platen principles used in accounts receivable applications are capable of symbolizing these data on statement, ledger, and posting proof, retaining totals of classification of product in adding mechanisms of the machine, while descriptive writing accounting machines of the cylindrical and flat platen types may, through the use of a wide carriage, afford columnar distribution provided the classification does not exceed the writing and adding capacity of the carriage. The use of posting media sorted prior to posting, and the use of a posting proof to serve as a journal of a specific classification, establishes one way of solving accounting conditions of this nature. Where the proof of posting is adopted, it is customary to use a different colored proof of posting sheet for each classification. If, however, it is not practicable to have each invoice cover only

one classification in cases where a wide variety of products is handled, it is then necessary to carry a sales analysis ledger, which must be posted at a separate operation, each classification to be given a ledger sheet. It is customary to use a copy of the invoice as the posting medium to sales analysis ledger whenever such a plan is adopted. Should the copy of the invoice contain more than one item, each item is posted in the sequence of the ledger accounts, and posting media are advanced to next classification until all items on those media are completely posted.

Factor 11. "Sales information by kinds of products classified on each customer's ledger sheet." Let us assume that a concern has ten salesmen, and sells five different kinds of merchandise upon which they pay their salesmen different rates of commission. Suppose it is desired to know the amount of business consummated with each customer by commodity. In order to accomplish the desired result, let the ledger sheet be designed with the customary old balance, debit, credit, and new balance columns, and in addition five extra columns, the first of which is to be used for the total sale, and the remaining four are to be captioned, one for each line of merchandise sold. The line entry then would require two clearances of the cross-footing device, because after the new balance is printed, the operator would be required to type the total sale which automatically adds in the cross-footing device. The operator must then analyze the gross amount of the sale in the four columns, each column functioning as a subtraction automatically restoring the cross-footer to zero as the composition of the total sale is being distributed in the respective columns.

The posting media under this plan are sorted according to salesmen's territories. All columns in this application are equipped with adding devices which accumulate totals as they are written. Upon completion of posting to the customers' accounts, the adding registers or totalizers are cleared onto a

permanent record which may be used for the computation of commissions. These totals should be posted each day to the salesmen's commission record, and the grand total is easily arrived at at the end of the month, or whatever period is set aside for the figuring of commissions.

Factors Required for Proper Routine Control

One of the outstanding features of mechanical accounting methods is the written proof of accuracy produced by the various accounting machines. These machined proofs are known as the tally roll, register sheet, proof sheet, or automatic audit sheet, each of which is simultaneously prepared with the writing of permanent records.

Tally Rolls.—The tally roll is produced on both cylindrical writing and printing platen machines, which shows either a list of previous balances of every account affected during the process of posting, or the amount of each medium posted with grand total. Wide tally rolls can be produced equally well on cylindrical platen equipment which will exhibit a complete descriptive chronological record of transactions in the exact sequence in which the entries were made, including grand totals.

Descriptive Proofs.—The descriptive "register sheet" as used on descriptive writing machines of the cylindrical-writing platen type, and the "proof sheet" or "automatic audit sheet" as used on descriptive writing machines of the flat-writing platen type, represent a perfect carbon impression of every key stroke made by the operator. The "audit sheet" used on printing equipment of the flat printing type is a permanent printed record of each registration or posting operation, and is made by a separate printing mechanism with which the machine is equipped. Each item recorded is identified by symbols which are printed automatically. The variety of uses

to which the descriptive tally roll, register sheet, proof sheet, or automatic audit sheet may be adopted, is practically unlimited, especially when used for purposes of check or audit or for subsequent references.

Since good accounting practice demands positive control, the establishment of control figures other than the machined control referred to above is advocated. Figures so established, either before or after machine operation, serve as a "positive check" against the machined control produced automatically, completely eliminating the possibility of any errors passing unnoticed.

Use of Proof Column.—The simple accounting machine principle of subtracting a credit from or adding a debit to an old balance so as to arrive at the amount of a new balance has been previously described. The "proof column" on the forms used in various machine applications serves as a mechanical check against picking up an incorrect previous balance which is performed merely by rewriting the amount of the previous balance in the "proof column." At the completion of machine operation, the accumulated total of "old balance column" should be in agreement with the accumulated total of the "proof column." This mechanical performance completely eliminates the human frailty to err, because every loop-hole wherein a mistake may lurk as far as the process of machine operation is concerned is absolutely closed.

Since "control" implies a series of "positive checks" on the mathematical accuracy of the various accounting processes, it must be remembered that the work performed by the machine operator should be subject to some form of control, and if a means of control is established during machine operation, or at its completion, a function of tremendous importance has been accomplished.

Certain types of equipment, especially those of the descriptive writing variety of both the flat and cylindrical platen

principles, directly control mathematical accuracy through the mechanism of the machine. Should a mistake in any entry of mathematical content be made by the machine operator, the mechanism of the machine will automatically lock at the end of that line, forcing the correction of the error before the next line entry can be made. Where descriptive machined control records are prepared, such errors and their correction will be shown thereon.

Block Method.—For the purpose of effecting a positive control it is often desirable in machine applications where ledger posting and statement writing are performed simultaneously, to divide a set of ledger accounts into several sections, the size of each section depending upon the activity of the accounts within it. To localize errors, if errors are made, a pen-kept control sheet is maintained for each "block" or "section," showing the total of all outstanding balances of accounts affected by the media to be posted, the predetermined total of the debit and credit posting media affecting such accounts, and the new total of outstanding balances of accounts so affected within each "block" or "section." These control sheets are summarized daily and transferred to a master control sheet, which is used to reconcile with the balances shown on the affected control accounts in the general ledger.

Where this method of control is adopted, the posting media are prearranged, first by "sections" or "blocks," and then according to the plan of indexing of each "section," and totaled. The predetermined total of media so established is checked against the machined proofs as produced at the completion of posting accounts affected by such media within each "section" or "block." If the machined proof discloses errors, only the accounts that have been affected within that "section" or "block" need to be checked to locate such errors. It must be remembered, however, that the maintenance of the master control sheet previously mentioned is not sufficient where a

large volume of postings prevail, because with only a master control it would be necessary to check through all work performed, should errors be made.

In ledger posting and statement writing applications which require a skeletonized ledger and detailed statement, a method of control known as the "call-back proof" is probably the most efficient of all ledger proof methods, since such applications usually require two separate "runs" of posting, i.e., first, postings made to the ledger accounts, and a second "run" of postings made to the statements, or vice versa. Upon completion of machine operation, the individual ledger accounts and statements are compared to prove that all previous balances have been picked up correctly, that all debit and credit postings have been properly made, that all new balances have been correctly computed, and that all postings have been made to correct accounts. To overlook an error under such a method of proof is almost an impossibility. Banks and similar institutions usually adopt this method of proof.

Since the preparation of work before machine operation is an important matter, three methods that have been found effective in identifying accounts affected by media to be posted and that afford a means of localizing errors, should the final machined proof disagree with predetermined figures, will be considered.

Offsetting Method.—The first method is called "offsetting." This method can only be used when binder devices or ledger trays are so constructed as to facilitate the function of projecting ledger sheets, either to the right or to the left of the regular line of account sheets before or during posting operations. Accounts that are to be or have been affected during a "run" of posting are "offset" in the manner referred to. This is done to indicate or mark the account that is affected by the posting media. When proof of posting is made, only the offset sheets (the sheets affected) need be taken into consideration.

After proof has been established, the ledger sheets that have been offset are placed back in their regular position.

Slugging Method.—The second method is called "marking" or "slugging" accounts, the procedure of which is as follows:

1. The posting media are prearranged in the same sequence as ledger accounts.
2. Each account affected is identified by a "marker." This marker is a strip of heavy paper placed in front of the affected account in a projected position.
3. A predetermined total is obtained of the media to be posted.
4. Posting is then made from media to affected accounts indicated by markers. The position of the markers is undisturbed throughout posting operation.
5. Should machined proof not be in agreement with predetermined figures established, only marked accounts need be taken into consideration in locating errors.
6. When proof is established, all markers are simply removed, thus eliminating the necessity of rehandling the account sheets as in the case of the offset method.

As accounts are indicated by "markers" or "slugs," this method affords speed and security in posting to right accounts if media are in a bound condition.

Stuffing Method.—The third method is called "stuffing." Under this method the prearrangement of posting media is made directly to the ledger by placing the media in front of the account affected in a projected position. The machine operators merely post to accounts so identified. Upon completion of posting, the media are left in ledger to indicate the accounts affected, so that if the machined proof is not in agreement with predetermined total established, differences are localized through media stuffed in ledger. After proof has been made,

these media are removed from the ledger. Where media are in a bound condition, this method is not practical.

The outstanding advantages of all the above methods are as follows:

1. Operators are relieved of the function of locating accounts affected.

2. A positive safeguard is established against posting to the wrong account through the verification of media and marked accounts made by the operator during the process of posting.

3. Operators can apply all their time to direct machine operation, thereby accomplishing greater production and economy in use of equipment.

Department Store Method of Control

To illustrate further the factors involved in effective accounting control, an accounts receivable application for a department store is selected because of the volume of media handled. Chart illustrating proper accounting control in a department store is shown in Figure 6. For the benefit of those readers who are not familiar with the accounting requirements that are necessary after a sale is made in this class of enterprise, the following is submitted.

Recording the Sale.—When a sale is made, whether cash, C.O.D., or charge, the sales clerk proceeds to make out a sales slip or ticket, usually in triplicate. This sales slip itemizes the sale. One copy is usually a tissue which remains in the sales clerk's book, and two copies are dispatched to the cashier via a "pneumatic tube," or over "cash carrier," or by "cash boy." If the merchandise is sold for cash, one slip is retained by the cashier, while the other is stamped "paid" and is returned to the sales clerk, to be delivered to the customer with the merchandise. If the merchandise is to be charged to the customer, one copy is stamped "O.K.," and returned by the credit office to the sales clerk authorizing the delivery of the mer-

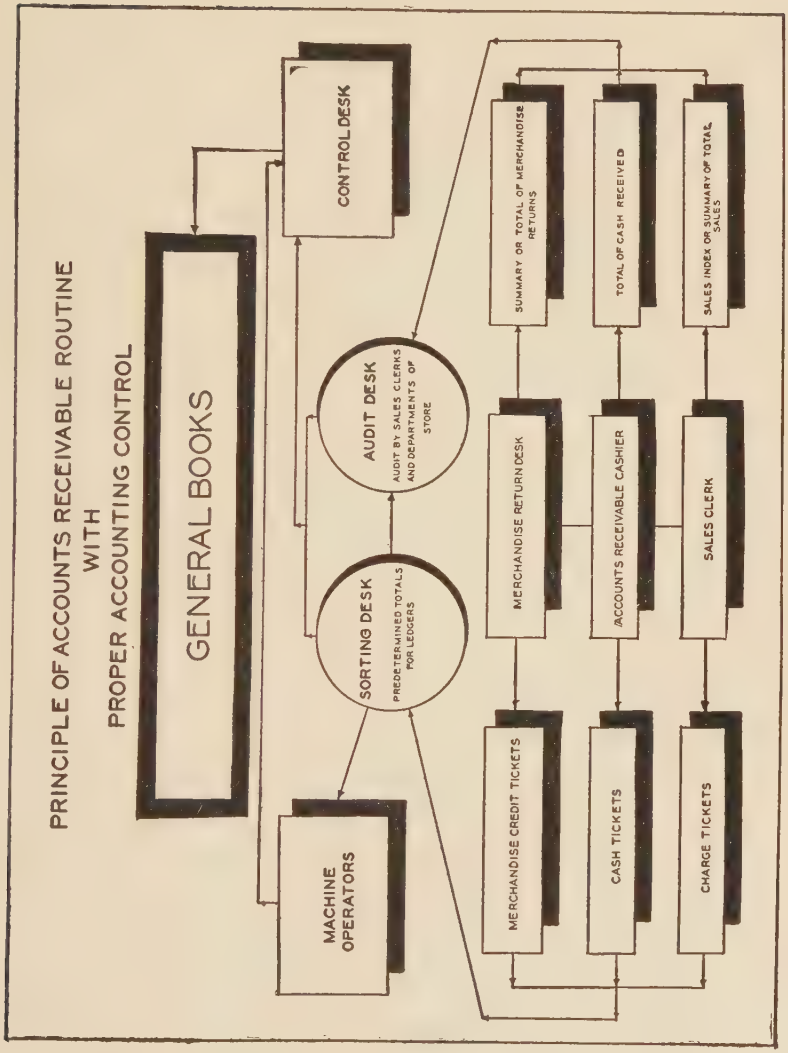


Figure 6. Chart Illustrating Principle of Accounts Receivable with Proper Accounting Control

chandise to the customer. If the merchandise is to be delivered by truck, the duplicate slip is dispatched with the merchandise to the delivery department, a copy being retained by the cashier as in the case of a "cash sale," or kept at the approving desk if a C.O.D. sale. In the case of a "charge sale," the copy is dispatched to the accounting department direct, or through the auditing department.

When the sales clerk prepares the sales slip, a record of the total amount of the sale must be made on the index in the back of the sales book. At the end of the day these indexes are totaled by each sales clerk, indicating therein the amount of the merchandise sold for cash, charge, and C.O.D. that day.

Audit Department Function.—An abstract is made of these index totals by a clerk from the auditing department, or in some instances the sales books are exchanged for new books at the end of each day. The current books are sent to the auditing department, where totals of the indexes of all books are audited and scheduled. The combined sales book index totals of a department will establish the total sales for that particular department. By adding all department totals, the total sales for the whole store are ascertained, provided that the sales clerks make proper entries of all their totals on the indexes correctly, and all additions have been accurately made.

A "positive check" is established by the auditing department when the total of all duplicate sales slips as surrendered by the cashiers and approval desk clerks are checked with the store total of the sales book indexes. When this is done, all the day's sales slips are then audited by departments. All duplicate sales slips must be accounted for, either by cash in possession of the cashiers, or by charge tickets. Since each sales slip is numbered consecutively, care is taken by the auditing department to see that every sales slip is accounted for. Thus, control over the figures of the entire sales force and cashier's receipts is secured.

It very seldom happens that the audit can be balanced by store totals at first take-off if there is a large volume of sales slips handled. Salespeople are apt to forget to record the amount of some sale, or perhaps the wrong amount of the sale is recorded on the sales book index. Delay in balancing is quite often brought about by misplaced or lost sales slips. The duplicate sales slips in such cases are checked against each department's total of sales book indexes as a further precaution against error. Departments that are out of balance are investigated by sorting sales tickets by clerks and totaling. The total thus ascertained is checked against the sales clerk's index totals until those sales books are found which are out of balance. Through this process of elimination, the sales slips belonging to a certain book are then checked one by one against the index of that book until the mistake or missing slip is located. All departments having thus been audited, the charge slips are ready to be dispatched to the bookkeeping and billing departments. In this manner the total amount of all charge tickets for the day is known and controlled.

Billing and Bookkeeping Department Function.—The auditing department then proceeds to sort the charge tickets by ledger division sequences, securing ledger division control totals. The grand total of all ledger division totals of sales tickets represents the predetermined total of the charge tickets for the day, which are then distributed to the respective ledger division for posting. The total of charge tickets posted to each ledger is automatically ascertained by machine operation, which figure is compared with the predetermined total established at the completion of machine operation. In a similar manner, predetermined totals are prepared of cash credits, merchandise returns, or other credits (journal entries or transfers), which are then posted by the various ledger divisions, and compared with machine totals automatically established at the end of the run of postings.

A master control sheet is maintained to which is recorded the grand totals of each day's work, against which all ledger division controls must prove. If there is any need for registers to total what the accounting machine posts, and if there is any need of machined controls for checking or other record purposes, there is certainly just as much need for a master control sheet or some similar form of recording the figures for control purposes.

With the right kind of control, satisfactory results can be secured under ordinary conditions. The machine operator must balance each day's work with the control clerk's figures before proceeding with other work. The day's work must be done the same day so as to be prepared for the work of the succeeding day. If this is done, the books will always be up to date and in balance.

Letter Control Method.—Let us assume that there are 26 ledger sections; one ledger for each section in turn, subdivided into six binders, making a total of 156 binders and 26 ledger-sections of the accounts receivable division. For simplicity of description, assume that there are 26 accounting machine operators, one for each letter in the alphabet with the responsibility of maintaining six binders or ledgers.

The following is an outline of ledger control by sections and binder divisions, which can be varied to suit the number of accounts to be cared for:

- ACCOUNTS RECEIVABLE LEDGER CONTROL
  - A—Ledger Section Control
    - Binder Control No. 1
    - Binder Control No. 2
    - Binder Control No. 3
    - Binder Control No. 4
    - Binder Control No. 5
    - Binder Control No. 6
  - B—Ledger Section Control
  - C—Ledger Section Control
  - D—Etc.

We will assume that all the machine operators are at their machines, with their six binders properly balanced and up to date, and each binder in a convenient place. A messenger from the auditing department now makes his appearance and places a package of charge tickets representing yesterday's sales on each operator's desk. Assuming that these charge tickets have already been totaled and arranged alphabetically in accordance with particular ledger sections, the operators are then ready to proceed with the work of posting.

Inasmuch as all charge tickets have been totaled, it is evident that someone in the accounting department has knowledge of the amount of each bundle of charge tickets. In other words, before the machine operators proceed to post, it is definitely known how much each operator is to post. The figure so established is known as a predetermined total.

Should the method of auditing be such that the tickets are not totaled, then no one knows the amount of charge tickets in each bundle. It is sometimes the practice that immediately after the machining of records is completed, another set of clerks is assigned to the work of determining the total of those tickets at a separate and distinct operation. That total is known as an after-determined total.

There are many department stores which make no provision for totaling charge tickets laid on each operator's desk, either before or after posting, and in many cases the operators, or assistants in the accounting department, are required to list the tickets on an adding machine in order to obtain a total of the bundles of charge tickets referred to. Whether the total of all charge tickets is secured in the accounts receivable department, or by some other unit within the accounting organization, it is nevertheless the controlling figure against which the accounting machine operators work. While the accumulated accounting machine figures will check with control figures obtained before or after posting operations, it is generally the custom, as well as better accounting practice, to

obtain the total before posting. That is why it is referred to as a predetermined total.

Before the "letter control" is described in detail, a further method of control called the "binder control" will be explained. Let us assume that the bundle of charge tickets placed on the section A operator's desk contains items amounting to $2,815.10. This total we will call a predetermined total. Section A operator proceeds to post these charge tickets, and when through, if the adding units of the machine indicate that the charge tickets posted amount to $2,815.10, the "positive check" thus established is conclusive proof that the work, so far as the process of machine operation is concerned, has been correctly performed.

It should be remembered that there are times when machine operators do not balance to the cent. Oftentimes a ticket is mislaid, or an item on a ticket is overlooked during the process of posting. Again, the auditing department, which usually furnishes the predetermined or after-determined total, may make a similar error, and then the search for the mistake begins. At this point it may be stated that if inefficient methods of control exist, it will take longer to find mistakes in the control than it does to find mistakes in posting.

Bearing in mind that the bundle of charge tickets amounting to $2,815.10 has been posted to six different binders of the A ledger section referred to above, we are confronted with the problem of locating the error. By referring to the "binder control," we find that the machine operator posted five of the six binders correctly, but made an error of omission in the sixth. In order to segregate mistakes and shorten the investigation for them, the accounting machine operator or someone else usually checks off the machined proof with the adding machine listing of the tickets that was prepared before posting by the control clerk. Through such a check the difference is disclosed.

Binder Control Method.—The factors involved in effective binder control are illustrated as follows. Let us assume that a batch of tickets totaling $678.15 (a portion of the $2,815.10 bundle), are to be posted to the second binder of the A ledger section. The machine operator proceeds to post, and upon completion takes an ordinary ledger sheet for her control sheet, inserts it in the machine and starts off with a balance which we will assume to be $15,687.92 (see illustration of binder control on page 142). The operator brings forward the old balance as in ordinary machine posting, writes the date (January 2) and the item (merchandise sales). The amount of $678.15 is then recorded in the debit column. The machine computes and establishes the new balance of $16,366.07, which when written in the new balance column automatically restores the cross-footing mechanism of the machine to zero.

Having performed this operation with reference to each section of A ledger, the operator then has six totals, the $678.15 referred to and illustrated herein, and the totals of the five other binders, which are added together and the result posted to a summary control sheet for all six binders. On the summary control sheet will appear merchandise sales, $2,815.10 for January 2. At some future time, should any possible question come up as to just what work section A operator performed on January 2, reference may be made to the control pages in each binder and to the summary control sheet of all binders in the A section, which were used to verify or prove the work performed by that section with some other section or general ledger control.

Let us assume further that the tickets amounting to $678.15 posted in the second section of the A ledger may be questioned. The first procedure would be to procure the machine operator's proof sheet for January 2, A ledger section, second binder, which provides all the necessary detail that involves the $678.15 questioned. It is customary to indicate on machined proofs that all figures are correct or otherwise.

CONTROL FOR SECOND BINDER OF "A" LEDGER SECTION

Old Bal.	Date	Detail	Dr.	Cr.	Bal.
	Jan. 1	Balance Forward.....			$15,687.92
$15,687.92	2	Mdse. Sales.....	$678.15		16,366.07
16,366.07	2	Mdse. Returned.....		$ 87.28	16,278.79
16,278.79	2	Cash.....		732.14	15,546.65
15,546.65	2	J. T. 2053 to C. B. Ampton (A) from C. B. Hampton (H).....	2.98		15,549.63
15,549.63	2	C. O. D. Release 2534 to S. M. Abbott.....	10.00		15,559.63

Thus, we observe that the machined proof furnishes the minute detailed information of exactly what made up the total of $678.15. On referring to the control sheets of the different ledger binders we are able to determine the composition of the grand total of $2,815.10 shown on the summary control sheet for the A ledger section.

Bundles of cash posting media, merchandise credits, allowance tickets, or other credits would be handled in a similar way, except that these are posted in the credit column of the customer's account. Entries made on the sectional control sheet are shown below.

LETTER CONTROL FOR ALL BINDERS IN "A" LEDGER SECTION

Old Bal.	Date	Detail	Dr.	Cr.	Bal.
	Jan. 1	Balance Forward...			$49,393.78
$49,393.78	2	Mdse. Sales.....	$2,815.10		
		Mdse. Returned...		$ 923.14	
		Cash.....		2,872.65	48,413.09

This summary or total of all binder controls in the A section shows the figures which the A machine operator furnishes to the control clerk.

How Adjustments Are Made.—By referring to the control for the second binder of A ledger section, it will be noted

that the fourth item on January 2 is J. T. (journal transfer) 2053 to C. B. Ampton of the A ledger section, from C. B. Hampton of the H ledger section in the amount of $2.98. This represents the journal transfer which is prepared in triplicate. This journal transfer should be so designed that the debit and credit can be entered in their proper places. In this particular case, the debit transfer is dispatched to the A ledger machine operator, and the credit to the H ledger section. When the auditing department originally sorted the bundles of tickets previously referred to, they apparently misread a $2.98 charge ticket belonging to C. B. Ampton, 17 Spring Street, as C. B. Hampton, 17 Spring Street. In consequence, this $2.98 ticket was sent to the H ledger section instead of the A ledger section, and the predetermined total of the items for the H ledger section was $2.98 too much, while the predetermined total of the charge tickets for the A ledger section was $2.98 short. Upon completion of machine posting the H ledger section operator discovered that there was no such account as C. B. Hampton in ledgers maintained by the H ledger section. Upon investigation it is found that the ticket rightfully belonged to the A ledger section, so that the operator immediately dispatched the ticket with journal transfer No. 2053, which was made out as indicated above.

After the operator of H ledger section prepares the journal transfer No. 2053, the $2.98 charge ticket is attached to the debit portion and is dispatched to the operator of the A ledger section. As soon as the A ledger section operator posts the journal debit of $2.98 to the section control sheet, the journal transfer is signed by the operator to indicate that the journal posting was properly made to the ledger and control sheet. The journal transfer is then dispatched to the general control clerk of all sections, or perhaps back to the sorting desk, or to the general ledger section, depending on the requirements of the routine adopted. When the operator of the H ledger sec-

tion posts the credit portion of the journal transfer, it is O.K.'d and dispatched in the same manner as outlined for the A ledger section. The triplicate copy of this journal transfer is left in the journal transfer book for checking purposes, in case of necessity.

Treatment of C.O.D. Items.—In cases where merchandise is sent C.O.D. but is released and charged to the customer, the C.O.D. department must have something to release it from the obligation because of the change from C.O.D. to charge account. This is known as a C.O.D. release, which is used as a credit to the C.O.D. department and a charge to the bookkeeping department. The handling of C.O.D. releases is similar to the posting media previously explained.

By referring to the control of binder 2 of section A (page 142), we find that to the balance of $15,687.92 on the first day of the month has been added the $678.15 predetermined total of charge tickets for the A ledger section, $2.98 journal transfer, and a $10.00 C.O.D. release, against which there are deductions of $87.28 and $732.14, representing merchandise returned and cash received, respectively, which explains why the balance of accounts receivable in the second binder of the A ledger was $15,559.63 the end of the second day of the month. Should there be any further question as to the correctness of these figures, the operator's record (or machined proof) can easily be referred to for explanation.

On the other hand, suppose the accounting equipment was not capable of producing a perfect visible control of accuracy, or no control sheet had been maintained by the machine operator, or no journal transfers had been prepared, but otherwise all of the entries had been recorded exactly as explained above, no intelligent audit could be made to prove anything except by checking over the whole month's work.

With the proper accounting control before machine operation, the most satisfactory proof of accuracy may be obtained

under ordinary conditions, but without the proper control there can be nothing but haphazard results and uncertainty.

Mechanical Dual and Unit Systems of Accounts Receivable

When deliberating on the method that will best meet all the requirements of good accounting practice in the application of an accounts receivable routine, one must consider, first, the kind of system to be adopted, and second, the economies such a system will effect over present methods if adopted. These systems are graphically illustrated in the chart in Figure 7.

Distinction between Unit and Dual Plans.—There are two distinct methods, i.e., unit and dual, and the adoption of one or the other will determine to a great extent the type of equipment to be used in the mechanical application of accounts receivable routines. Under the unit plan the customer's ledger forms a carbon copy of the monthly statement; that is, the customer's statement and ledger sheet are posted simultaneously, while under the dual plan the customer's statement contains the details of the day's purchases, and the total of such purchases is posted on the ledger sheet at a separate operation. Under the dual plan it is necessary to maintain an extra system of records comprising duplicate statements. There are numerous deviations from the principles outlined, both under the unit and dual plans, which will be explained later.

In considering either plan there are three important factors which should be very carefully analyzed, and which will undoubtedly determine the final selection of the equipment to be used.

1. Economy of operation.
2. Accuracy required.
3. Satisfying need of credit department.

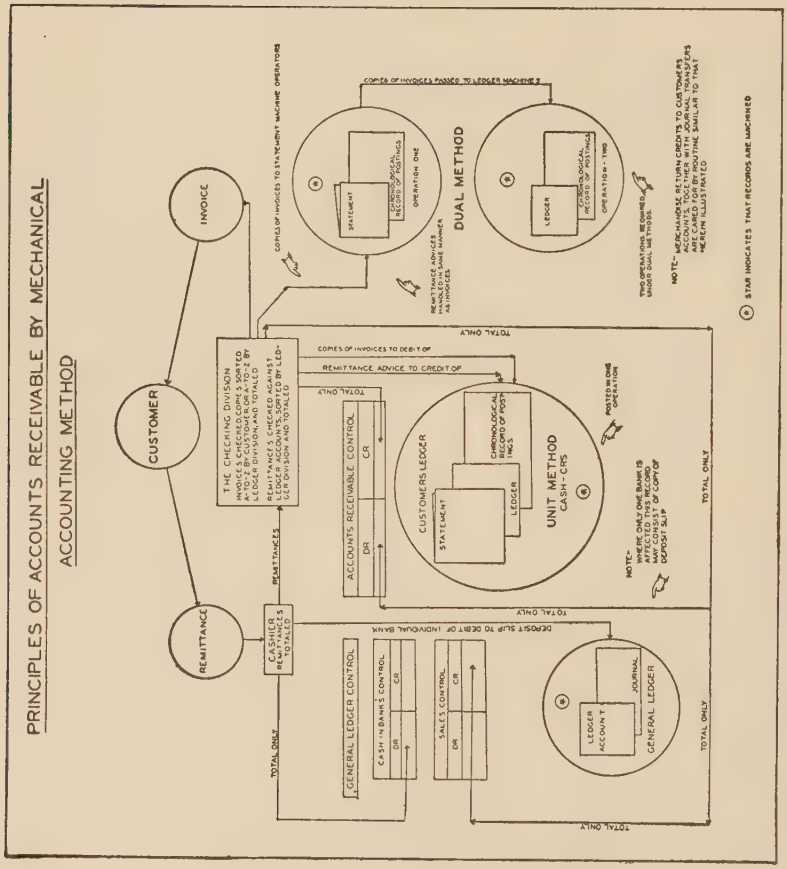


Figure 7. Routine Chart Illustrating the Principles of Accounts Receivable by Mechanical Method

In the handling of charge accounts in department stores the unit plan has proved of advantage over dual methods from the standpoint of cost of operation. One machine operator under the unit plan performs both billing and posting functions at the same operation. There is, however, an opportunity for error in posting to the wrong account under the unit method if the ledgers are not "stuffed" correctly. In many instances it has been the experience of the authors that where the dual plan was chosen as preferable, billing machines were installed, and under such a method all bills were prepared in duplicate, and totals were posted daily to the ledgers at a separate operation by machine.

The number of items per sales check, activity of accounts, and the number of sales checks per customer per visit to the store, are other factors which govern the selection of either plan. Grocery, house-furnishing, and notion departments tend to create long sales checks, which in turn result in overrun ledger sheets if the detailed charges are copied. This is quite expensive when one considers the stationery cost. Under the unit plan all details are required on the ledger unless special provisions are made to eliminate itemization of such charges by placing the total purchases in that department for the day as one charge.

Activity of accounts is equally important. Stores having very active accounts will fill up their ledger sheets very rapidly if the detail of the sales check is copied. Number of sales checks per customer per visit to the store is also very important. This is a problem which should be given very serious consideration before any particular plan or machine is adopted.

It has been found upon investigation that the average number of items per sales check or ticket amounts to two, and that a customer usually buys in ten departments every month, which, therefore, averages 20 items per customer, or 2½ inches per bill and ledger sheet.

Where the unit plan with mechanical accounting equipment

has been adopted, itemized statements of grocery department purchases, for example, have been eliminated, except upon special request of the customer. Where the dual plan is adopted, this procedure may also be followed, and in making this change, customers are usually notified that:

1. Grocery purchases are not itemized on monthly bill except upon special request, because preference is given by most customers to checking each order as it is received with the duplicate sales check which accompanies each delivery, and then saving these checks and comparing their amounts with the monthly bill.
2. That such a method not only simplifies matters, but also saves the store a great deal of unnecessary duplication of effort in bookkeeping.

Why Dual Plan is Considered Preferable.—The principal contention for the selection of the dual system is that it gives more flexibility and promotes accuracy, together with the fact that the ledgers are at all times free for the use of credit and other departments. Another reason that may be advanced in its favor is that it makes the replacement of operators an easier matter. A still further advantage of the dual plan is that it prevents the possibility of posting to the wrong customer's account, since billing is done at one operation, while posting to the ledger is performed at another, and both bills and ledgers are finally checked by direct comparison. It must be remembered, however, that the dual system is considerably more expensive to operate than the unit plan.

Advantage of Unit Plan.—The advantages of the unit plan may be summed up as follows:

1. It obviates the necessity of keeping separate detailed records of customers' accounts for the credit department.
2. Affords assurance that customers' statements and ledger accounts are in agreement.
3. Furnishes credit department with current, up-to-date detailed records of customers' accounts.

4. Provides for automatic daily proof of postings.

5. Through the employment of stuffers, it furnishes a check on postings as to correct accounts.

6. It obviates the necessity of having to compare statements with ledger accounts at the end of the month before mailing, a time saving which is very valuable at that time.

Another feature in favor of the unit plan is that it requires less mechanical equipment in the application. Consequently the initial cost is less than that of the dual plan.

The dual plan affords the preparation of a bill that is simpler and easier for the customer to understand, and it is not necessary to carry forward the previous month's balance, provided it has been paid, which is necessary under the unit plan. Many customers object to this carrying forward of the balance, but it is advocated for the unit system that customers can be educated to understand this form of bill as readily as those billed under the dual plan.

The next question that should be considered is the type and adaptability of the machine that will meet all the requirements of the best accounting practice. It is a difficult decision to make, for each has its particular advantages. None seems to stand out prominently above the others for this class of work, and opinion, as indicated by the variety of machines in use, seems to be fairly well divided.

It might be interesting to mention the fact that a majority of mechanical accounting installations in department store accounts receivable applications are functioning under the unit plan. The dual plan requires a considerably larger installation of bookkeeping machines, with a relative increase in space necessary for operation of the department.

In comparing the number of postings per operator per day under the dual and unit plans, stores using the unit plan average from 300 to 600, while those using the dual plan average from 300 to 675. As previously explained, under the unit plan the

operator posts the sales check and prepares the bill at the same operation. The figures above are given on this basis. Billings per operator under the dual plan, that is, the number of items (sales checks, credits, and merchandise returns) billed each day are the basis of the figures referred to above. The dual plan operators bill 10% more on the average than those using the unit plan, but one must take into consideration that the operators working under the unit plan make the ledger posting and check totals at the same time.

The non-itemized ledger, under the dual plan, is often regarded as more satisfactory to the credit department. It is contended that the detail on the ledger sheet, if considerable, makes it more difficult for the credit manager to obtain the information he is seeking than if totals only were posted. A customer's purchases for one month may extend over one entire ledger page, especially in the holiday season, and if further extension of credit is required, or if for any other reason the credit manager is desirous of analyzing the account as to its age, activity, promptness of payment, etc., he may be required to go over several ledger sheets, necessitating considerably more time than if all the information which he wanted were on one page.

Then again, where the unit plan is used, a separate ledger sheet is very often maintained every month for each account. Under such a plan it is necessary to head up new statements each month, and carry over the account rendered of the preceding month. In instances where twelve ledgers for each division are maintained for a year's posting, this involves a tremendous amount of work that could otherwise be eliminated. Under such an arrangement the credit department is not usually furnished with a duplicate statement of the customer's account. They are required to use the current ledgers which are being billed on and the ledger of the preceding month to procure the necessary information by means of which they can do their

"dunning." The adoption of such a method under the condition cited is not recommended.

The difficulty of consulting the ledgers for credit purposes or otherwise under the unit plan may be overcome by maintaining a distinctly separate set of card records. This card is prepared during the process of posting. Then, too, it is the practice of many stores to furnish the credit department each month with a transcript of every open balance. These data are usually written in a loose-leaf collection book, and if compiled by machine, require about 1½ days of the operator's time at the beginning of each month. It is stated by those who use such methods that it saves considerable disturbance in the bookkeeping department, and that the credit department with such a record has a history of the account for a number of years with references, etc., which could not be kept in the bookkeeping department.

While the unit plan is able to produce a carbonized ledger, those supporting the dual system state that frequent reference to these ledgers by the credit and adjustment departments result in smudgy-looking ledger sheets. Credit and adjustment investigators consulting the ledgers also interrupt the machine operators, who are continually using the ledgers. This is eliminated under the dual plan, because investigators would refer either to the file of duplicate bills (for adjustments) or to the ledgers in charge of the bookkeeper, and not the billers as under the unit plan.

Credits and Collections through Account Age Analysis

The work of the credit department, to be effective, depends largely on the methods used for the approval of credit; i.e., for that act of affixing approval on the customer's orders or prospective purchases. It seems reasonable to assume that adequate records, efficiently used, will result in effective

methods. In common or current usage, the records that are regarded as essential are as follows:

1. Customers' ledger, maintained in the accounts receivable department of the general accounting division.
2. Complete credit record card—invariably in visible index form—maintained in the credit department.
3. Partial credit record card—invariably maintained in visible index form—maintained in credit department.

The customers' ledger record is almost always used as the sole basis for approving orders where a separate record is not maintained in the credit department. It has been regarded by many that such a method has one outstanding advantage, namely, economy. This advantage is more apparent than real, as will be noted in the disadvantages listed below:

1. The method involves a considerable amount of lost and ineffectively used time, because credit clerks are forced to visit the accounts receivable department to locate ledger records, which are often out of file, due to being in process of posting, or are otherwise in use.

2. The volume and accuracy of the operative accounting routine work of the accounts receivable department is materially affected, due to interruptions and stoppages of routine functions by credit clerks.

3. The usual form of ledger record does not afford a good perspective of the debtor's status on first inspection, since the determination of the status requires analysis. The actual balance due on the ledger record, even though it is considerably less than the credit limit, is of no real significance from a credit-approving standpoint. Orders accepted and approved but not shipped must be added to the actual balance outstanding on shipments previously made to obtain the true status of the vendee's liability. In addition, the age analysis of the account must also be considered. Such an analysis consists of a schedule of the overdue period of the various items representing the composition of the actual balance outstanding. Few ledger records are adaptable for the preparation and the keeping up to date of such an analysis.

4. The method requires the examination of the ledger record for every order, whereas such a condition should not be necessary. Under a method described later, if the ledger records are to be consulted at all, such reference is confined to those accounts which are in doubtful or bad condition, and which are usually made apparent through a system of "flagging" which will be explained.

Credit Record Cards.—During the experience of the authors, it has been their privilege to inspect numerous forms of credit records cards used for credit purposes. Most of the credit record cards that were examined not only embodied a complete duplication of the data contained in the ledger record, but other data relating to credit limits, orders in process of filling, and factors of vital credit significance as well. The credit record card plan does not contain all of the disadvantages of the plan previously mentioned, but the cost of maintaining such a record is quite high.

Indirect Use of Ledger Record.—To illustrate the manner in which indirect use may be made of customers' ledger records but where credit approval is fundamentally based on the use of a partial credit record card, the following method is presented. A card record is maintained in the credit department to show credit limit and other credit data of vital significance. Each customer's ledger account indicates the "credit limit." Ledger clerks receive proper instructions to advise the credit department (by interdepartment memorandums or special forms) whenever a customer's debit posting increases the actual balance of the account to within 75% of the established credit limit. All accounts are reviewed each week by ledger clerks, and the credit department is notified of these accounts that are past due. The credit department's only function so far as account status is concerned, is a simple notation on the customer's credit card each time the account is past due, credit approval being based on reference to the credit limit cards. In cases where the account in the ledger record is not "flagged"

as being doubtful, an ordinary clerk may pass on credit provided that the account is not a new one. On those accounts which are "flagged," credit approval is reserved for the credit manager.

Plan Generally Adaptable.—It may be stated that such a plan is adaptable for use in retail, wholesale, and manufacturing businesses. In businesses where terms require one monthly settlement of all items purchased during the preceding month, the weekly function of checking past due items is eliminated, as this function is performed monthly. Where the approving of proposed purchases is in charge of an "authorizer" (such as maintained in department stores), who, by telephone or automatic mechanical device, approves or rejects credit after speedy reference to a readily available visible index of tabbed or flagged credit card, a plan of this type will reach its maximum effectiveness. In such cases, however, an "approval" phone is usually installed for the purpose of referring doubtful cases to an executive in charge who is vested with the authority to allow purchase, or to take other necessary steps, as may be deemed expedient in connection with "flagged" accounts.

Regardless of the nature of the basic records, the collection method depends largely upon terms of credit, trade customs, and the type of business. It has been found in manufacturing and wholesale businesses that terms usually commence from the specific date of each bill. In most cases the billing department of the general accounting division furnishes salesmen or collection representatives with copies of bills, which are filed in alphabetical sequence in accordance with vendees' names. These bills serve as a collection tickler, and when paid are destroyed. Copies of customers' monthly statements are also used for collection purposes, either solely or in conjunction with copies of bill just referred to. In department stores and other types of retail businesses, as well as in manufacturing and wholesale concerns, where terms of sale require one monthly

settlement, the duplicate monthly statements of customers' accounts are employed except in isolated cases. Where mechanical accounting equipment is not used, and where statements are prepared by hand, the salesmen or collection representatives obtain the status of customers' accounts direct from customers' ledger records.

Follow-Up of Past Due Items.—In the various collection plans just stated, it is possible to follow closely and effectively individual past due items. This is more apparent in those cases where copies of invoices are used than where statements and ledgers are employed. It may also be stated that at least in their actual operation, few, if any, of these plans visualize for the salesmen or collection representatives the proper status of the account as a whole by making continuously and readily available an "up-to-date" age analysis of each account, or of all accounts combined. It is one thing to visualize an account with a balance, for example, of $1,500 of which $1,000 is past due, etc., but a vastly different and more valuable impression is obtained, from the collector's viewpoint, if an age analysis is made, showing that:

$250 is current.
$500 is 30 days past due.
$250 is 60 days past due.
$150 is 90 days past due.
$350 is more than 90 days past due.

If such an age analysis is regarded as a valuable aid for collection purposes, which seems self-evident, the ideal condition would be that of having it continuously and in readily available form for all accounts, instead of preparing it only in special instances for specific accounts which are investigated closely when it appears that the condition of the vendee's account is becoming acute.

With a few minor omissions and variations, the plan to be described is adaptable to any business, where the credit terms

require or permit settlement once a month. The plan may also be adopted by those firms who sell on standard terms, as for example, "2%–10 days, net 30." A broad general account age analysis may be prepared in such cases to serve as a key to collections, rather than to be used as an absolute basis for action.

Advantages of Account Age Analysis.—The major advantages of the account age analysis plan from a credit and collection standpoint are the same in any type of business. In department store installations, where the factors involved are greatest and the number of departments and sub-departments affected and served is maximum, this plan should produce very effective results. Variations may be necessary because of the peculiar requirements of other lines of business.

Machine Preparation of Account Age Analysis.—Where mechanical descriptive writing accounting equipment is used, the following steps are required in the preparation of the account age analysis report hereafter referred to as the "analysis."

Operation 1. Previous to the monthly closing date, an age analysis of each ledger account should be obtained. The result of this analysis should be recorded (with classification written in full) on one of the margins of the ledger sheet in the following manner:

Unpaid Charges	Amount
Previous Month	$276.92
Second Month	215.10
Third Month	192.15

The analysis should not include the current month's charges or receipts against such charges. The current month figure will be obtained automatically during the process of typing the analysis as explained below. The analysis can be made any time during the month but since the major portion of collections are made by the 20th of the month, it is recommended to defer analysis until after that date. The collections that affect the past due analyses

which are received after completion of ledger analysis must be applied to, or deducted from, the memorandum total or totals. The relationship between ledger sheet and account age analysis is shown in Figure 8.

Operation 2. Subsequent to mailing customers' statements, the following blank copies of the analysis form (interleaved with carbon paper) should be properly inserted on the writing platen of the machine:

1. Collector
2. Cashier
3. Credit Bureau Service Clerk
4. Credit Department
5. Comptroller
6. Merchandise Department

Operation 3. A blank customer's statement to be used for new month's entries, for the first account in the ledger is placed on the analysis, properly aligned, as illustrated in Figure 9. The writing of the name and address on the statement may be accomplished in one of two ways by means of: (a) descriptive writing accounting equipment, or (b) addressing equipment or typewriter. It is desirable that these data be written on the statement as outlined in the following operation.

Operation 4. The actual balance of the account is first written in the "Balance" column of the statements, which is then followed by writing on the analysis the customer's name and address.

Operation 5. The memorandum amount as shown in the past due analysis on the margin of the ledger sheet is then written in the various columns of the analysis, which may be arranged to suit requirements. As amounts are written in these columns by machine, the cross-footing mechanism of the equipment will indicate the balance due on net charges incurred during the preceding month.

Operation 6. In the "Outstanding Month" column of the analysis is written the amount shown by the cross-footing device of the equipment, and upon typing, the cross-footing device is automatically restored to zero.

Analysis of Account in District of DALLAS — Salesman MC ARDLE — MARCH 19--

R	M C	Outstanding Over 4 Months	Outstanding 4 Months	Outstanding 3 Months	Outstanding 2 Months	Outstanding 1 Month	BALANCE	CUSTOMER	ADDRESS
			1354 67	60 50	1241 23	8986 60	11643 20	FORWARD	
C1	2500 00				50 09	150 00	200 09	R T UNDERWOOD INC	1792 MAPLE AVE
C2	1000 00					193 20	193 20	SAM UTTER	630 CARR AVE
C2	1000 00						95 34	GEORGE VICTOR	273 FIRST AVE
C2	2000 00					150 00	676 23	ARTHUR S VREELAND	219 SHERWOOD AVE
			1354 67	60 50	1291 32	9329 80	13008 06	TOTALS	

Exhibit A2

STATION 46 NAME ARTHUR S VREELAND
BUSINESS GARAGE ADDRESS 219 SHERWOOD AVE DALLAS TEXAS
TERMS 2/10/30 PAGE NO 2 RATING C2 LIMIT 2000 00

OLD BALANCE	Unpaid Items Over 4 Months	Unpaid Items 3 Months	Unpaid Items 2 Months	Unpaid Items 1 Month	BALANCE	
192						

DATE	DESCRIPTION	DEBITS	CREDITS	BALANCE	
3/29	FORWARD			756 23	
3/31	61069	120 00		876 23	☆
4/5	64895	10 09		886 32	☆
4/7	CASH		192 15	694 17	☆
4/11	69893	230 00		924 17	☆
4/15	CASH		316 54	607 63	☆
4/23	75672	5 68		613 31	☆
4/24	75021	120 00		733 31	☆
4/27	CASH		50 06	683 25	☆

Exhibit A1

FOUR COPIES OF THIS ANALYSIS — PREPARED AS FOLLOWS:

1- LOCAL CREDIT MANAGER.
2- ACCOUNTING DEPARTMENT TRIAL BALANCE.
3- GENERAL AUDITOR.
4- SALES REPRESENTATIVE IN THE GEOGRAPHICAL TERRITORY IN WHICH THE ACCOUNTS ARE LOCATED.

RECAPITULATIONS ARE PREPARED SUMMARIZING THE VARIOUS ANALYSES SO THAT THE GRAND TOTALS OF EACH AGE GROUP ARE OBTAINED.

Figure 8. Showing Relation of Ledger Sheet to Account Age Analysis

Operation 7. Operations 1 to 6 should be continued for all accounts in the ledger or ledger control group. The type of equipment adapted for use in this routine should be capable of accumulating figures written in each column.

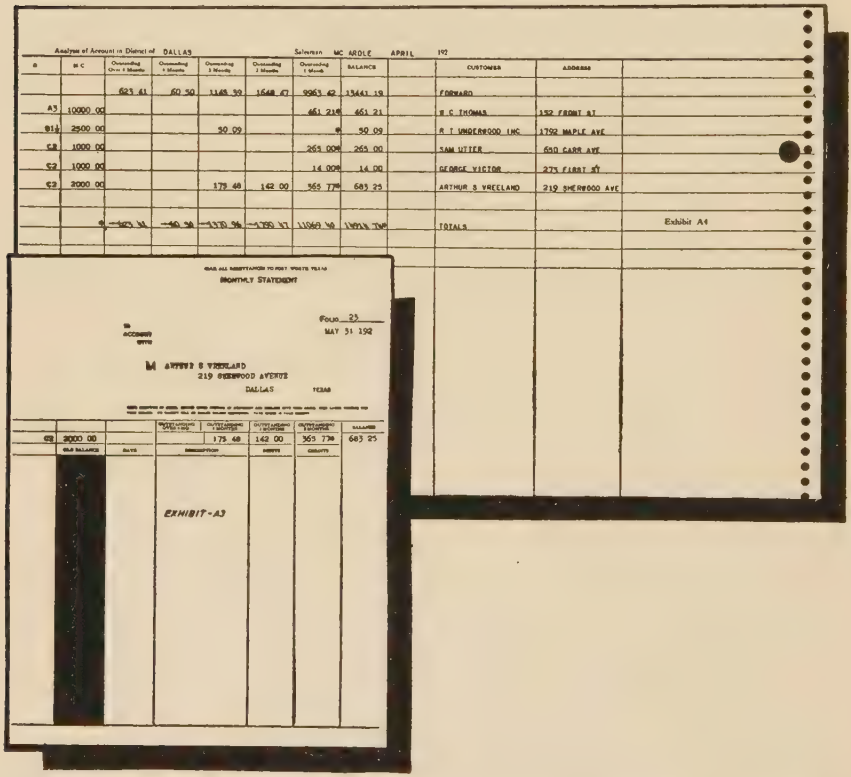


Figure 9. Showing Relation of Customer's Statement to Account Age Analysis

Operation 8. Upon completing the last account, all totals appearing in adding registers or totalizers of the machine should be transcribed on the same analysis. It will be observed that three important functions have been performed by the above operations, as follows:

1. Actual balance of accounts transferred to new month's customers' statements.

2. Trial balance prepared automatically.
3. Account age analysis prepared in sufficient number of copies to serve the purposes indicated in operation 2 above.

Operation 9. Determine whether the total or trial balance figure (in "Balance" column of analysis) is in agreement with general ledger control account.

Operation 10. Distribute copies of analysis as indicated in operation 2 above.

Operation 11. During the current month collections from, and credit memorandums to customers are posted to the collector's copy of the analysis, thereby reducing balances due from customers for the various periods. (A more descriptive explanation of the routine and advantages derived from the different copies of the analysis will be made later.)

Operation 12. At the end of each month customers' statements are removed and mailed, using the collector's copy of the analysis and the balance of the ledger as guides, the same procedure indicated above is repeated.

The procedure of transcribing the past due amounts from the previous month's posted analysis, is performed by writing the amounts remaining in the columns of the former (except the "Balance" column) one column further to the left of the latter, i.e., the figures appearing in a column captioned "Outstanding 1 month," would then become "Outstanding 2 months," and entered in that column.

Analysis as Collection Record.—The salesman or collection representative has a continuous age analysis, an invaluable aid in collecting past due accounts, through the simple procedure of applying collections and other credits to the analysis. References to the ledger record become no longer necessary except in very extraordinary cases. Notations may be made on the analysis as to the promises made by the debtors, the numbers and dates of form letters mailed, follow-up dates, etc. In cases where the debtor visits the place of business of

the vendor, the psychological advantage of being able to read the ages of various amounts of his account from a sheet cannot be overestimated, since it indicates to the debtor that the company is giving close scrutiny to all accounts.

Department Store Method.—An almost universal practice in department stores is the requirement of cashiers to examine the ledger account before accepting cash in cases in which the customer holds no statement or other record of the amount due. All difficulties and complications of this kind are easily removed through the adoption of the account age analysis. Reference to the ledger accounts is not only unnecessary, but also such references could not, without a considerable amount of calculation, portray the facts immediately obtained from the analysis. Another point, in fact, is where the cashier is provided with the exact composition of the customer's account, in which case the customer may be diplomatically referred to the past due condition. This often results in securing a larger payment from the customer. In such instances, the cashier can politely inquire when payment of the balance may be expected, noting the same on the analysis in the presence of the customer. The adoption of this method has proved that collections in the first 10 days of each month are much heavier than would be possible without the use of the analysis, and that cashiers serve more customers with more accuracy and satisfaction than could otherwise be performed in the absence of the analysis.

The department store procedure of credit passing or approving is based on the application of the "exception" principle; that is to say, all proposed purchases are approved except for those accounts which have been tabbed or flagged to indicate an excess of past due items, or exceeding of the credit limit, and for those accounts the credit limit of which would be exceeded by contemplated purchases. If it were necessary to refer to ledger accounts in each case, that function alone would require the maintenance of a score of clerks at a tremendous

cost. This condition has been considerably relieved through the almost universal adoption of maintaining an authorizer, who is placed in charge of a visible index of all customers, each small card in the index showing the credit limit and providing for various flaggings, which afford the authorizer with a basis for immediate decision. The procedure provides that the accounts receivable department of the general accounting division should notify the authorizer of those customers which are approaching, or which have exceeded the maximum credit limit; of receipts affecting flagged accounts, and other information of vital significance. The credit department, under the jurisdiction of which the authorizer functions, provides the basis for the placing of restrictions on or removing of restrictions from index cards.

Where the account age analysis is adopted, it not only insures more prompt and effective flagging of accounts which are becoming acute, but also provides valuable data from which to change the signals. This latter function is usually performed from the collection department's copy of the analysis immediately after it is completed, and after credit department executives have made their inspection thereof, for the purpose of noting exceptions to the policy which will govern the authorizer. The policy varies with different department stores, but the average practice requirement is to flag accounts in which 3 months' charges have accrued.

As requests are made by the sales department for credit approval on flagged accounts, the authorizer immediately communicates with the collection department, who refer to their copy of the analysis, from which a quick decision may be made without the necessity of reference to the ledger record in the accounts receivable department of the general accounting division. When credits, such as collections, etc., are applied to the analysis, the collection department is in possession of vastly more information than could be derived from the ledger, except as to current month charges. As the collection

department posts collections and credits to their copy, they prepare a list of accounts from which restrictions are to be removed, or on which signals are to be changed in some respect, dispatching same to the authorizer daily, who effects the removal or revision in the index maintained by him. Requests for credit on small purchases may be authorized by the collection department under the procedure outlined.

Since most department stores are associated with an organization composed of representative stores, which maintains a credit bureau service for members' benefit which is provided (usually upon request) with the ledger experiences of customers with whom member stores deal, a clerk known as the "credit bureau service clerk," is usually employed by the progressive store. The duties of such a clerk consist of maintaining up-to-date credit files of vital information. The analysis is invaluable to the credit bureau service clerk, and is used in conjunction with credit files, thereby reducing reference to ledger records to the time required to note the current month's balance. The analysis also provides the basis for the mailing of various "credit" forms which stress the importance of paying, and facilitates the rendition of effective reports upon request.

Other Uses of Account Age Analysis.—In addition to the foregoing, the account age analysis establishes a better list of prospective buyers for direct mail campaign than could be otherwise obtained, since the store's own customers are recipients of merchandising announcements represent an excellent source of further sales. The analysis also contains names and addresses of all customers, whether active or inactive buyers. The list therein contained is of great value to the merchandising departments. With the use of the proper mechanical accounting equipment in preparing the analysis, the figure section may be omitted or detached from the name and address section on the merchandise department's copies and be dispatched to that department.

CHAPTER VI

ACCOUNTS RECEIVABLE SYSTEMS (Continued)

Machine Installation.—Having emphasized in the previous chapter the general considerations, methods, and fundamental or primary factors of accounting control involving the use of mechanical accounting machines, we will next consider the different factors concerned with the preparation necessary for an installation of a machine system of accounts receivable. As a typical illustration an accounts receivable system is presented in Figure 10. The installation procedure outlined covers the important steps that are essential if maximum results are to be procured.

Importance of Routine Analysis and Survey.—The basis of every successful installation must be sought in the nature of the conditions existing, and this presupposes a physical examination of present methods. It is not enough to inspect the books, for an analysis of accounts cannot give all the necessary data required. The extent and character of the information required in system surveys, as outlined in this chapter, will enable the individual making the survey for machine installation purposes, to obtain the necessary data that will determine whether or not mechanical methods are applicable, or whether a saving can be effected through its installation. In addition to collecting constructive information along the general lines indicated in this chapter, it should be borne in mind that other considerations, such as organization and personnel efficiency, must be noted.

In the course of the system survey, the examiner must consider carefully the organization of the department, and

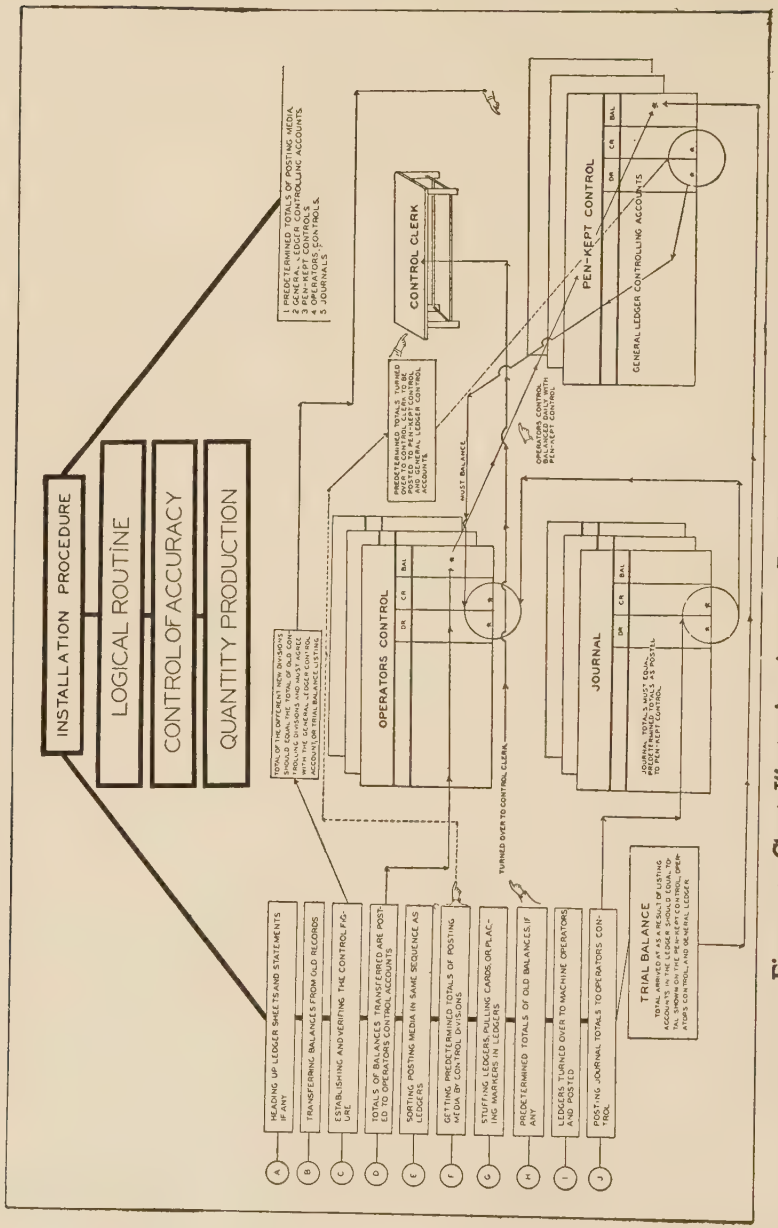

INSTALLATION PROCEDURE
LOGICAL ROUTINE
CONTROL OF ACCURACY
QUANTITY PRODUCTION
A HEADING UP LEDGER SHEETS AND STATEMENTS IN ANY
B TRANSFERRING BALANCES FROM OLD RECORDS
C ESTABLISHING AND VERIFYING THE CONTROL FIGURE
D TOTALS OF BALANCES TRANSFERRED ARE POSTED TO OPERATORS CONTROL ACCOUNTS
E SORTING POSTING MEDIA IN SAME SEQUENCE AS LEDGERS
F GETTING PREDETERMINED TOTALS OF POSTING MEDIA BY CONTROL DIVISIONS
G STUFFING LEDGERS, PULLING CARDS, OR PLACING MACHINES IN LEDGERS
H PREDETERMINED TOTALS OF OLD BALANCES, IF ANY
I LEDGERS TURNED OVER TO MACHINE OPERATORS AND POSTED
J POSTING JOURNAL TOTALS TO OPERATORS CONTROL
1 PREDETERMINED TOTALS OF POSTING MEDIA
2 CHECK FIGURE FOR CONTROLLING ACCOUNTS
3 PEN-KEPT CONTROLS
4 OPERATORS CONTROLS
5 JOURNALS
TOTAL OF THE DIFFERENT NEW DIVISIONS SHOULD EQUAL THE TOTAL OF OLD CONTROL FIGURE. THIS SHOULD AGREE WITH THE GENERAL LEDGER CONTROL ACCOUNTS ON TRIAL BALANCE LISTING
CONTROL CLERK
PREDETERMINED TOTALS TURNED OVER TO CONTROL CLERK TO BE POSTED TO PEN-KEPT CONTROL AND GENERAL LEDGER CONTROL ACCOUNTS
MUST BALANCE
OPERATORS CONTROL
DR CR BAL
TURNED OVER TO CONTROL CLERK
OPERATORS CONTROL BALANCED DAILY WITH PEN-KEPT CONTROL
PEN-KEPT CONTROL
DR CR BAL
GENERAL LEDGER CONTROLLING ACCOUNTS
JOURNAL
DR CR BAL
JOURNAL TOTALS MUST EQUAL PREDETERMINED TOTALS AS POSTED TO PEN-KEPT CONTROL
TRIAL BALANCE
TOTAL ARRIVED AT AS A RESULT OF LISTING ACCOUNTS IN THE LEDGER SHOULD EQUAL TO THE TOTAL OF THE GENERAL LEDGER OPERATOR'S CONTROL AND GENERAL LEDGER

Figure 10. Chart Illustrating Accounts Receivable Installation Procedure

ascertain whether the department head is one that can be relied upon for the responsibility of its proper operation. While the examiner's mind is occupied with the active details of his examination, he must subconsciously consider how each feature that develops is going to find a place in the system, and what special modifications are needed to make the system fit the conditions. Thus his information is of two kinds; first, the constructive information necessary to the designing of the system; and, second, a critical knowledge of the defects and weaknesses that need immediate attention. It must not be thought, however, that an examination of this nature will discover anything but surface defects. It remains for the actual installation of the system to detect and locate defects beneath the surface.

Program of Survey.—Answers to the following questions should furnish comprehensive information in regard to the operating condition of an accounts receivable routine generally maintained. Any additional data that are obtained concerning particular routine requirements will prove helpful. Should the survey be made in a department or specialty store, it is necessary to ascertain whether the system is maintained under dual or unit plans, as explained in Chapter V. The amount of media handled under either plan is a factor of importance where mechanical accounting equipment is used, and such data will aid considerably in determining whether the maximum of production is being obtained from the equipment in use.

Accounts Receivable Routine.—When examining an accounts receivable routine for the purpose of machine installation, the following list of queries should prove helpful.

1. How many accounts are maintained in accounts receivable ledger?
2. How many active accounts?
3. Ascertain how accounts are filed in ledger.
   (a) Alphabetically?
   (b) Geographically?

(c) By salesmen?

(d) Other arrangement?

4. Could a saving be effected by a rearrangement of the ledgers?

5. How are ledger records kept?

(a) Cards?

(b) Loose leaf?

(c) Bound book?

6. Is work performed by hand?

(a) If by machine, ascertain make and type of equipment in use.

(b) What is the average number of postings per day per machine during the most active month in the year?

7. Are the transactions for an entire month included in the month's business?

(a) If not, what day are books closed?

8. Ascertain average number of postings made daily to most active customer's account.

9. At what hour or hours during the day are the posting media ready for posting?

10. Is cash book written by hand?

(a) If by machine, ascertain make and type of equipment in use.

11. Is sales journal written by hand?

(a) Same as question 10 (a).

12. What is the nature of the debit posting medium?

(a) Number of debit postings per average month.

(a) For cash.

13. What is the nature of credit posting media?

(b) For merchandise credits.

(c) For miscellaneous credits.

(d) Ascertain number of each of the credit postings per average month.

Note: To secure the average number of debit and credit postings per month, use as a basis the number of postings for a slack month and for the most active month in the year.

(1) Number of debit postings.

(2) Number of cash postings.

(3) Number of merchandise postings.
(4) Number of miscellaneous postings.

14. Ascertain the number of working days per average month.
15. Ascertain on what date or dates monthly statements are written.
    (a) Date mailed.
    (b) Does statement represent exact transcript of account?
    (c) Are open items listed only?
    (d) Are statements written by hand?
    (e) If by machine, ascertain make and type of equipment used.
16. Has any trial balance trouble existed?
17. Is a daily balance extended after each posting?
    (a) If not, would this feature be desirable?
18. Is a monthly total required of sales and cash collections for each customer?
19. Would conditions permit the writing of a bill, sales journal, and posting ledger with statement in one operation?
    (a) If not, ascertain reason.
    (b) What is the extent of the descriptive data on bills?
20. Would it be more desirable to write bill in detail, and post ledger in skeleton with statement and sales journal in one operation?
    (a) If not, ascertain reason.
21. Would conditions permit writing the cash book and posting the ledger with statement in one operation?
    (a) If not, ascertain reason.
22. Would a saving be effected by writing a customer's monthly statement, sales journal, and cash book with posting to ledger, all in skeleton form, in one operation?
    (a) If not, ascertain reason.
    (b) Obtain objection, if any, to customer's monthly statement being an exact transcript of the account.
23. Ascertain whether credit department keeps a record with each customer of all orders, charges, and cash receipts.
    (a) When are these records made?
    (b) How are records kept?
        (1) Card?
        (2) Loose leaf?
        (3) Bound book?
    (c) Are records written by hand?

(d) If by machine, ascertain make and type of equipment used.

(e) What is the nature of the posting medium used?

24. Ascertain how credit department obtains the status of a customer's account.

(a) Would a duplicate of the customer's ledger prepared at the same time posting is made prove desirable?

25. Is a card index maintained, or other separate means in addition to the ledger, so that credit department can pass on customers' purchases?

26. When does an account become delinquent—30, 60, or 90 days, or other period after the bill is rendered?

27. How are delinquents followed—by delinquent sheets, delinquent cards, or does collection department work directly from the ledger?

28. Ascertain number of people employed in accounts receivable routine, whether male or female, hours devoted each day, and total salaries paid.

29. Obtain copies of forms and records used with complete entries.

30. Note any additional information that may prove helpful.

After present methods have been thoroughly examined and all information has been properly classified, the next problem is to produce data through the use of machines most adaptable to meet the peculiar requirements brought out by the examination. With this done, together with the designing of the necessary forms to be used on the machine chosen to fulfill requirements, the next problem is to see that the system designed will perform its functions thoroughly, and at the same time be practical in its working, bearing in mind that the change is being made for the purpose of effecting a saving per annum to the amount of the initial cost of the installation or more.

Steps Necessary to Machine Installation.—The various steps in connection with a machine installation in which a ledger record is used may be briefly summed up as follows:

1. Heading up ledger sheets and statements.
2. Transferring balances from the old pen-kept records.

3. Control—establishing and verifying the control figure.
4. Control—posting to operator's control.
5. Sorting posting media in same sequence as ledger.
6. Control—taking predetermined total of postings.
7. Stuffing the ledger, or pulling cards.
8. Proving old balances.
9. Posting.
10. Daily proof—control bookkeeper.
11. Preparing for next month.
12. Trial balance.

Heading Up Ledger Sheets.—The first step of the installation referred to above should be devoted to heading up ledger sheets and statements for each customer, which should be ready for transfer of balances before the first of the month in which the installation is to be made. Care should be taken to ascertain just what data are to appear on the ledger sheets at the time of heading new ledger. Most businesses desire ratings, credit limits, and special data to be entered on their accounts for ready reference purposes. These data can easily be noted on the ledger sheet at the time the new ledgers are opened. The "heading" operation can be performed on the machine adopted for use, providing it is a descriptive writing machine, or with an addressing machine.

Transferring Balances.—As soon as possible after the first of the month, balances should be transferred from the old to the new ledgers. It is not necessary to wait until the pen bookkeepers have balanced all accounts with the general ledger control before transferring the individual balances, because in many instances, were the operator to wait for a proved control balance on the old ledgers, the current accounting would be days, possibly weeks, late. Consequently, the operator should proceed to transfer balances as shown on old ledgers, whether or not such ledgers are in balance with the general ledger control. It is, however, essential that the starting figure or

balance of the accounts so transferred be accurate before proceeding with current postings.

It is very essential that a total be obtained as a result of the transfer of the old ledger balances and be checked against the general ledger control to determine if such pen-kept records are in balance. Should they not be in balance at the time of transfer, the composition of the transfer should be checked against the trial balance listing of the old ledgers, so that errors later discovered can be adjusted on the new ledgers by journalization. Verbal instructions, pencil notations, or erasures should not be tolerated under any consideration. Never, under any condition, should such balances be transferred without proof, or without verifying the amounts transferred by checking the total of the accounts so transferred against the general ledger control or a listing of the old ledgers.

In many instances a change in the division of the control is made at the time of installation. This depends upon the system in use before the installation of mechanical methods. When the transfer is completed and the old books are in balance, the total of the new control established by the transfer should agree with the old ledger control, general ledger control, or trial balance listing.

Establishing Control.—After the accuracy of the control figure has been established, the operator should open a control sheet which should be kept in the front of the first ledger making up the control division. It should be kept independently of the general ledger control. It is good accounting practice to reconcile the operator's control (binder control) figures with pen-kept control figures at various intervals.

Method of Control.—In all cases, however, there must be a control clerk, not necessarily a person whose entire time is given to the functions of a control clerk, but someone delegated to act in that capacity. This is entirely feasible, because the work of a control clerk takes only from 10 to 20 minutes a

day in installations where there are not more than 6 machines. Care should be taken in selecting the person for this duty, and the importance of the function should be impressed upon the individual. This person's other duties should not be seriously interfered with on account of this work. The functions of this clerk will be described more in detail later.

Sorting Media.—Referring to the fifth step, which deals with the sorting of the posting media, it might be stated that this function may be assigned to a clerk who sorts the media in the same sequence as the ledgers, securing predetermined totals as explained in the previous chapter. These totals are usually obtained on adding machines. The adding machine tapes are often attached to the machined proof sheets as prima facie evidence of the accuracy of each day's posting.

Stuffing Ledgers with Media.—After the posting media are properly sorted in the same sequence as the ledgers, they are turned over to a clerk to be "stuffed" into the ledgers; i.e., to insert the posting media in front of the various accounts affected. These media should project several inches beyond the side of the binder, so that the machine operator can easily locate the various accounts. In the case of new accounts, the posting media are usually stamped "New Account" by the proper authority, and a blank statement and ledger sheet is placed in the proper place in the binder. In case the ledgers are made up of cards, the cards are "pulled," and the posting media placed on top of them, or the posting media or markers are placed in front of the accounts affected. The latter from experience has been found the more desirable method.

This "stuffing" or "pulling" can be done by a clerk designated for that purpose, or by the operator, should the amount of bookkeeping to be done on the machine not warrant assigning a special clerk to this work. Stuffing ledgers or pulling cards affords an additional check against posting to the wrong account and greatly facilitates the posting.

Proving Old Balances.—After the binders have been "stuffed" or the cards "pulled," an adding machine listing of the balances appearing on all the accounts to be affected is usually prepared. This procedure is strongly recommended if the machine adopted for use does not prepare a "proof tally or sheet" indicating old balance figures during the process of posting.

Machine Posting.—We have now reached the ninth step in the installation procedure referred to above, and if maximum results are to be obtained posting current month's work should never be started later than the fifth of the month in which the installation is being made. Late starts invariably bring about trouble. In every instance the operator should be instructed as to the exact information to be entered at the time of posting. Extreme care should be taken to see that the operator thoroughly understands how to read the posting media, so that no time is lost and data are quickly and accurately ascertained. Cooperation and coordination of everyone directly or indirectly connected with the installation at this point are absolutely necessary, as they have everything to do with the success of the installation. It should always be remembered that late starts are dangerous, because of the fact that when the operator sees unfinished work accumulating, a desperate effort is made to get up to date, and consequently a lot of dangerous short-cuts are resorted to, which seriously affects the accuracy of the work.

Machined Proofs.—As soon as the operator has completed a run of postings, machine "proofs" should be turned over to the control bookkeeper for checking purposes against predetermined totals, errors, and corrections, as well as credit balances, because these are irregular entries in machine bookkeeping. Should there be any sort of discrepancy, these machined proof tallies or sheets should be turned back to the operator immediately for the purpose of locating and correcting

errors, which should be located and corrected the same day. After the proof sheets have been approved by the control bookkeeper, the total postings, as shown on the machined "proof tally or sheet," should be posted to the operator's control sheet, and filed away in a binder provided for that purpose for future reference. These machine-written proofs are usually filed chronologically according to their control divisions and classifications of postings, and are the safeguards that surround the operator so that the accuracy of the work can be established.

Preparation for Succeeding Month's Work.—In preparation for the succeeding month's work, all statements should be headed (inserting name and address) during the current month, and should be available for use for the transfer of balances the moment the last posting for the month has been entered on the ledgers. That work is usually performed during the operator's spare time, or by some typist who may have spare time, or even on an addressing machine. This procedure enables the operator to start posting much earlier in the month than would be possible were the operator required to do that work after the last month's statements had been rendered.

Trial Balance.—When statements are prepared during the process of posting to the ledger, the statements are ready to be sent to the customers immediately after the last posting for the month has been made. The trial balance of the ledgers is usually ascertained through the medium of the statements which may be made before or after mailing, by means of listing the balances on an adding machine.

Invariably it is difficult to see quickly just where one month ends and the next month begins on ledger sheets where there are many items crowded closely together. Quite frequently the operator forgets to write the name of the month at the start of a new month's posting. This makes it difficult to determine what month the record covers. These troubles and complaints do not arise where proper care is used, but in large com-

panies it is often difficult to keep everyone under control, and in small concerns it quite often happens that those in charge are too busy with other duties to watch the details.

There is a way in which this trouble can be remedied, viz., by the use of different colored carbon paper over the ledger sheet each month. For example, February posting to the ledger is done through the use of blue carbon, March, purple carbon, and April by black carbon. Black, purple, and blue will be found sufficient in all ordinary cases to make a decided contrast between each month's work, and to bridge over inactive months when some customers may not purchase. By this arrangement anyone using the ledger for reference purposes can see at a glance what constitutes each month's record.

Placing and Coordinating Responsibility.—In further outlining the duties of control clerks, machine operators, and assistant operators, the following instructions are presented, and if adopted and strictly adhered to will produce effective results:

Duties of Control Clerk

1. The control clerk has charge of the machine operators and their assistants.

2. He shall arrange the work and shift the operators or assistants to the positions in which they are best qualified to expedite the accurate handling of the work.

3. He has charge of the individual ledger control as well as the general control of the accounts receivable.

4. Any person desiring information from the ledgers will obtain same at the direction of the control clerk, who should not permit any person to interrupt the operators or hold up the progress of the work.

5. It is to be distinctly understood that the control clerk will hold the machine operators and assistant operators personally responsible for the correct balancing of the work assigned to them.

Duties of Machine Operators

1. The binders, having been stuffed by the assistant operators, are turned over to the machine operators, who will post the ticket (charge, cash, and merchandise returns) to the various accounts.

2. Upon completion of the posting, the totals on the machine registers shall be copied on the bottom of the machined proof sheets for each ledger and proved.

3. These totals must balance with the predetermined totals which were taken off by the assistant operators.

4. The operators shall keep in the front of each ledger an individual control sheet on which they shall record daily the total postings of charges, cash merchandise returns, etc.

5. At the beginning of each month the balances should be carried forward to a new statement and the total of the ledger balances must agree with the ledger control.

Duties of Assistant Machine Operators

1. The auditing department turns over to the assistant operators, charge, cash, and merchandise return tickets, each sorted alphabetically and totaled. The assistant operators shall then divide these tickets into binder divisions and list them on an adding machine according to ledgers.

2. The combined totals for all the ledgers must balance with the auditing department total and the cashier's total for the day.

3. The ledger number and the date must be written on each adding machine tape, and after all the totals have been proved the adding machine lists should be given to the control clerk.

4. The assistant operators should properly stuff the different kinds of tickets into the binders in front of the statements to which postings are to be made.

5. After the binders have been stuffed and before they are turned over to the machine operators, an adding machine list is made of the balances on all the accounts to which postings are to be made.

6. These adding machine lists should show the ledger and date, and should be turned over to the control clerk.

While rapidity in hand-posting is rarely thought of in actual practice by non-users of mechanical equipment, because accuracy is the principal consideration, it should always be borne in mind that, in mechanical accounting practice, speed is judged much in the same manner as in the case of hand-posting, which means doing each day's work carefully, thoroughly, and accurately, so that there will be no delay in balancing and finishing at the end of the month. The mechanical method is considerably faster than the pen-kept method, because by its procedure the bill or statement is prepared at the same operation that the ledger is posted. Furthermore, if the operator does make a mistake, it may be detected instantly by the mechanism of the machine, or by means of carbonized records of entries which certain machines produce. By this method errors can be very quickly located and corrected, and the day's work positively balanced, so that there are no mistakes to investigate at the end of the month.

CHAPTER VII

OTHER RECEIVABLES

Rules Governing Survey Programs.—In this chapter programs are presented to give the reader a general idea of the methods to pursue in surveys of accounts receivable and similar routines. It is not feasible, nor always desirable, to set up a full and definite program for every routine survey, because good judgment will dictate the order in which the general inspection of an accounting condition of receivables can best be analyzed as the examiner's work develops. Besides devoting sufficient consideration to all existing routine operative methods in every system of accounting, special attention must be given to the required records peculiar to the business under system survey, while those records of a general nature, common to the industry to which it belongs, need no undue consideration. In the solution of operative accounting routine problems, certain rules must be observed, if it is desired that the survey be thorough.

1. The examiner should make a comprehensive and exhaustive analysis of the predominating factors of the business concerned, from all angles of approach.

2. He should have a complete understanding of the principles of the business whose system of accounting is under review.

3. He should have a thorough and comprehensive understanding of the object of all accounting routine work being performed.

4. All doubtful phases of operative accounting routine should be thoroughly investigated and a comprehensive exhibit of the examiner's findings should be made so that a definite plan may be developed for solving the difficulty.

5. Before introducing changes in present routine methods, the examiner should deliberate properly on his findings to see if the solution arrived at meets all requirements.

6. Before accepting the solution as final, the following three questions should be seriously considered:

(a) Is the solution an improvement over present methods?
(b) What is the approximate cost of maintaining the proposed routine?
(c) Is the cost justifiable?

Every qualified examiner should be capable of not only performing the routine task of all accounting conditions being dealt with, but should also have a knowledge of the many ways in which large quantities of accounting media in many kinds of businesses are handled with the use of mechanical accounting equipment, because such a knowledge will enable him to accomplish results in the designing of routines that involve the handling of mass detail, with a minimum of effort and expense.

Operating Standards.—Since the basis upon which the efforts of clerical workers and accounting machine operators are measured is time, and in order to attain a certain monthly production, particularly with regard to machined media so as to avoid end-of-month confusion, it is necessary to establish a standard of quantity to be produced each hour, and such hourly standards of production should be in direct ratio to the end-of-month peak load requirements. By this is meant that all the component parts of the operative accounting routines, such as the preparation and flow of media, control of media, and machining of necessary records, should be analyzed in order to establish a definite rate per hour so as to meet end-of-month peak load requirements. The chief reason for production deficiency in many instances may be due to lack of media flow. The theoretical maximum production capacity that is governed by the amount of clerical time required on any group of operations, and the sum of such clerical labor time required on each unit, plus the necessary time for dispatching from one unit to another, is very seldom approached. Some of the

difficulties encountered which prevent complete attainment of theoretical capacity are as follows:

1. Inequality of the volume of work to be done.
2. Interruptions to work such as:
   (a) Lack of media to work with.
   (b) Information required is not at once available.
   (c) Changes of work through change of plan.
   (d) Changes of work because of poor planning.
3. Lack of planning and scheduling.
4. Lack of standards.

Setting of Standards.—The setting of standards is based fundamentally on the following three necessary and very essential steps which should be considered carefully:

Step 1. A thorough analysis and study of the existing routine or method. Such studies involve:
   (a) The operation.
   (b) The method used.
   (c) The employee.

Step 2. From information thus obtained, modifications and changes may be made. Care should be exercised to retain all the valuable points of the method or routine under examination.

Step 3. The setting of standards of output should be considered next. They can only be equitably established after step 1 and 2 have been thoroughly considered.

Time Studies.—It may be stated that where a number of individuals are engaged in identical work, it is essential that time studies be made. The constructive use of the stop watch largely depends upon the tact of the observer, and there often arises a question as to the advisability or desirability of making time studies with a stop watch in connection with ordinary office and operative accounting routine work. However, in making time surveys for clerical or operative accounting routines, the following should be considered:

1. The actual time required to do the work.
2. The actual time required for the work to travel between points in the routine.
3. An allowance for probable delays which can be foreseen.
4. An allowance for possible delays which cannot be foreseen.

Other Surveys.—It is impracticable to discuss all the special points which might arise in surveys of accounts receivable and similar routines for all enterprises, but in the following pages suggestions are presented regarding surveys for certain accounting routines in specific lines of businesses which involve the handling of large quantities of accounting media, and in which peculiar conditions exist, or where special emphasis is required. No attempt, however, will be made to cover every condition to which mechanical accounting equipment can be applied advantageously, because the flexibility of specific equipment or combinations of equipment to accounting conditions is unlimited.

Commercial and Savings Banks

Within recent years, operative accounting routines involving the use of mechanical accounting equipment in commercial and savings banks and trust companies, have completely changed methods that were long regarded as highly efficient. The tendency has been to abridge and simplify methods of handling great quantities of accounting media. The use of mechanical accounting equipment has, in a large measure, been responsible for much simplification in operative accounting methods without sacrifice of system and adequate record.

Unlike the accounting requirements for mercantile or manufacturing companies, every bank meets practically the same accounting problems, and the disposition of these problems is universally well established, although refinement in operative

routine methods through the use of labor-saving accounting devices should be given keener consideration.

In bank system surveys, considerable attention should be given to all accounting conditions that involve the handling of large quantities of accounting media, for the purpose of reducing clerical effort and cost. The amount of media handled, and the detail necessary in the accounting requirements of depositors' accounts, offer an excellent illustration of an accounting condition to which labor-saving mechanical accounting devices may be applied advantageously. In examining such accounting conditions for the purpose of machine installation, the following list of queries should prove helpful.

I. Depositors' Accounts:

1. Ascertain what style of ledger is used.
   - (a) Boston.
     - (1) Bound.
     - (2) Loose leaf.
   - (b) Unit.
     - (1) Bound.
     - (2) Loose leaf.
     - (3) Card.
   - (c) How written?
     - (1) By hand?
     - (2) If by machine, ascertain make and style of equipment in use.

2. How many accounts are maintained?
   - (a) Active.
   - (b) Inactive.
   - (c) Are active and inactive accounts kept together or separately?
   - (d) If separately, are inactive accounts kept in same form of ledger and posted in the same manner as active accounts?
   - (e) Are accounts carrying unclaimed balance kept in same ledger having active accounts?
   - (f) If not, are they carried in a special ledger?
   - (g) If carried in a special ledger, how often are such accounts transferred from active individual ledgers?

3. Are checks and deposits posted in detail or in totals?
   (a) How many checks in all are posted per day?
   (b) How many deposits are posted per day?
   (c) How many checks are posted from the clearings daily?
4. Ascertain full particulars concerning clearings.
   (a) What time are daily clearings obtained, including Saturdays?
   (b) What time must checks be returned to other banks daily, including Saturdays?
   (c) At what time are clearings sorted?
   (d) When are they available for posting?
5. Are individual ledgers proved daily?
   (a) By what method?
   (b) How often is balance taken?
   (c) How is posting to right account secured?
   (d) How much time is devoted daily to sorting, posting, proving, locating errors, etc.?
6. Is a passbook or statement system maintained?
   (a) If statement is rendered, how is it prepared?
      (1) Hand?
      (2) If by machine, ascertain make and type of equipment in use.
7. How often are statements rendered?
   (a) What proportion are mailed and when?
   (b) What proportion are called for and when?
   (c) How are statements headed?
8. If passbook system is maintained, are they balanced for part or all depositors?
9. Is interest paid on all accounts?
   (a) If not, on what proportion of accounts is interest paid?
10. Is such interest recorded in the ledger or upon a separate interest book?
   (a) When is interest credited to the accounts?
   (b) By whom is this work done?
   (c) How is work proved?
11. Is a debit and credit journal maintained?
   (a) Are debits kept separately?
   (b) Are debits and credits combined in journal?
   (c) Are items and customers' names entered in detail?

12. How many clerks are employed in depositors' accounts routine?
    (a) Male and female.
    (b) Number employed on posting individual ledgers.
    (c) Number employed on passbooks and statements.
    (d) How many hours per day are devoted by each?
    (e) At what time is work begun and completed daily?
    (f) What is the average salary paid?
13. What is the cost per annum of stationery, including passbooks, statements, ledger sheets, and binders for individual ledgers?
14. Ascertain copies of all forms with sample entries completely made.
15. Note any additional information that may prove helpful.

II. Savings Department Ledgers:

1. Ascertain what style of ledger is used.
    (a) Bound.
    (b) Loose leaf.
    (c) Card.
    (d) How written.
        (1) By hand?
        (2) If by machine ascertain make and style of equipment in use.
2. How many accounts are maintained?
    (a) Active.
    (b) Inactive.
3. Ascertain who posts ledger.
    (a) Teller.
    (b) Bookkeeper.
4. Is ledger posted before customer leaves window?
5. How many ledgers are used?
6. Ascertain the maximum number of deposits and withdrawals made daily.
7. Are withdrawal and deposit slips used?
8. Is a daily journal of deposits and withdrawals maintained?
9. Ascertain whether tellers are required to extend balance on the passbook at the time of entering deposits or withdrawals.
    (a) Is the balance noted on the deposit or withdrawal slips?

10. Ascertain method used to prove accuracy in posting to right account.
    (a) Also correctness of amount posted.
11. How often is interest computed?
12. Ascertain full particulars concerning method of computing and posting interest.
13. How long before interest date is work begun?
14. How soon after interest date are postings and proof completed?
15. How many clerks are employed in this routine?
    (a) Male and female.
    (b) How many hours per day are devoted by each?
    (c) At what time is work begun and completed daily?
    (d) What are the total salaries paid?
16. Ascertain stationery cost per annum.
17. Obtain copies of all forms with sample entries completely made.
18. Note any additional information that may prove helpful.

III. Correspondent Banks Ledger:

1. Ascertain what style of ledger is used.
    (a) Bound.
    (b) Loose leaf.
    (c) Card.
    (d) How written?
        (1) By hand?
        (2) If by machine, ascertain make and type of equipment in use.
2. How many accounts are maintained?
3. Determine maximum number of postings made daily.
    (a) Debits.
    (b) Credits.
4. How are statements written?
    (a) By hand?
    (b) If by machine, ascertain make and type of equipment in use.
5. Ascertain method used to prove accuracy in posting to right account.
    (a) Also correctness of amount posted.

6. How many clerks are employed in this routine?
   (a) Male and female.
   (b) How many hours per day are devoted by each?
   (c) At what time is work begun and completed daily?
   (d) What are the total salaries paid?
7. Ascertain stationery cost per annum.
8. Obtain copies of all forms with sample entries completely made.
9. Note any additional information that may prove helpful.

When analyzing the requirements of individual ledger routine conditions for "country banks," it is essential to obtain full information in regard to the number of accounts handled with other banks in addition to the foregoing data.

In collection and transit departments, where a large volume of media is handled in connection with existing accounting requirements, information in regard to the following questions should be obtained:

I. Domestic:
   1. Ascertain maximum number of letters of transmittal written daily.
      (a) To Federal Reserve Banks (direct sendings).
      (b) To correspondent banks.
      (c) How many copies?
      (d) How written—hand or machine?
         (1) If by machine, ascertain make and type of equipment used.
      (e) How distributed?
      (f) Approximate number of items per letter.
   2. Ascertain maximum number of letters advising credit for proceeds of collection written daily.
      (a) How are these letters written—hand or machine?
      (b) If by machine ascertain make and type of equipment used.
   3. Are tickets advising collection of "window items" written in the note tellers department?
      (a) Maximum number daily?
      (b) How many copies?
      (c) How distributed?

(d) How written—hand or machine?
(e) If by machine, ascertain make and type of equipment used.

4. What form of collection register is maintained?
   (a) What information is recorded thereon?
   (b) How many copies?
   (c) How distributed?
   (d) How written—by hand or machine?
   (e) If by machine, ascertain make and type of equipment used.
5. How many clerks are employed in this routine?
   (a) Male and female.
   (b) Number of hours per day devoted by each.
   (c) At what time is work begun and completed daily?
   (d) What are the total salaries paid?

II. Foreign:

1. Ascertain the maximum number of acknowledgments and copies thereof that are written daily on export collections.
2. Ascertain the maximum number of acknowledgments that are written on import collections.
3. Ascertain the maximum number of letters of transmittal that are written daily to foreign banks.
4. How are the above acknowledgments and letters of transmittal distributed?
5. How written—hand or machine?
   (a) If by machine, ascertain make and type of equipment used.
6. What information is shown by the following forms, and ascertain the number of copies prepared.
   (a) Export collection register.
   (b) Import collection register.
   (c) Discount record for import collections.
   (d) Drawers' record.
7. How many clerks are employed in this routine?
   (a) Male and female.
   (b) Number of hours per day devoted by each.
   (c) At what time is work begun and completed daily?
   (d) What are the total salaries paid?

Accounting conditions in note and discount departments offer excellent possibilities for the machining of records. The writing of several different forms in one operation serves to eliminate duplication of work, i.e., the machining of "due notices" to maker, endorser, etc., may be accomplished with greater accuracy, speed, and productive results. Among the questions the examiner should ask are:

I. Note Ledger:

1. In what form is the record of an individual's liability as endorser maintained?
2. In what form is the record of an individual's liability as maker maintained?
3. In what form is "time loan" maturity record maintained?
   (a) Sheets.
   (b) Cards.
4. In what form is daily loan and discount register maintained?
5. What distribution is made as to kind of loan?
6. How many separate "due notices" are prepared?
   (a) How many separate transactions of the following are there daily?
      (1) Notices to makers.
      (2) Notices to banks and other endorsers.
7. Is interest computed on ledger sheet, statement stub, or separate interest book?
   (a) Who does this work?
   (b) How is it proved?
8. How many clerks are employed?
   (a) Male and female.
   (b) Number of hours devoted to each class of work per day.
   (c) Total salaries paid.
9. Obtain copies of all forms and records with sample entries completely made.
10. Note any additional information that may prove helpful.

II. Discounts—Domestic:

1. Are discount tickets prepared for each item discounted?
   (a) Maximum tickets written daily.

(b) How written?
(c) If by machine, ascertain make and type of equipment used.

2. Are discounts recorded in an "offering book" or register?
   (a) How is such record written—hand or machine?
   (b) If by machine, ascertain make and type of equipment used.
3. What auxiliary records and reports are prepared?
4. Ascertain the form of discount tickler.
   (a) Sheets.
   (b) Cards.
5. How many clerks are employed?
   (a) Male and female.
   (b) Number of hours devoted to each class of work per day.
   (c) Average salary paid.
6. Obtain copies of all forms and records with sample entries completely made.
7. Note any additional information that may prove helpful.

Trust Companies

Since accounting methods and supplementary records differ widely among trust companies, the examiner must deal with existing accounting conditions along the lines of the various analyses given above, although answers based on the following general queries will invariably lead to the essential features and operative accounting routine requirements.

1. Are transactions entered by officials and tellers on unit vouchers?
2. Are transactions posted direct to ledgers from these vouchers?
3. Obtain full description of books and records maintained.
4. Are ledgers posted by pen?
   (a) If by machine, ascertain make and type of equipment used.
5. How many different entries are made of an item covering a receipt?
6. How many different entries are made of an item covering a disbursement?

7. Are statements prepared by pen?
   (a) If by machine, ascertain name and type of equipment used.
   (b) How often are statements prepared?
   (c) Number of copies?
8. How many clerks are employed in various accounting routines?
   (a) Male and female.
   (b) Number of hours devoted to each class of work per day.
   (c) Total salaries paid.
9. Obtain copies of all forms and records with sample entries completely made.
10. Note any additional information that may be helpful.

Stock Brokerage

The inevitable high cost of maintaining dependable accounting records for stock brokers is a problem with which the management of every brokerage firm is much concerned. Mechanical accounting equipment is adaptable to the most diversified accounting requirements, and the use of such equipment in stock brokerage accounting has resulted in simplification of operative accounting routine methods in which speed, accuracy, and economy are predominating factors.

The technical character of the business of stock brokerage itself presupposes a set of rather technical books and operative accounting routines in connection therewith, and if the one making a system survey does not possess a technical knowledge of the business, very little will be accomplished. For many years operative accounting routine methods have been governed by the somewhat dictatorial nature of accounting practices which prevail throughout all brokerage firms, due to the influence on records of state laws and stock exchange rules. A strict adherence to what may be termed "precedent," is also largely responsible for the establishment of certain policies of accounting application, and one will find that the system maintained in one brokerage firm will be found in another, with few

exceptions. Although the application of brokerage accounting is highly diversified in character, the important features of systems generally maintained are practically the same.

Pursuant to the law of agency, the broker owes his customer an accounting in connection with those transactions entered into by the broker for, and on behalf of, his principal. Therefore, in analyzing this phase of the accounting requirements for stock brokerage firms, the following general queries should prove helpful to the individual making such a survey:

1. How many active accounts are maintained?
2. Ascertain the average number of charge and credit postings entered daily.
   (a) Ascertain the number at peak.
3. Obtain full information in regard to the accounting as maintained with branch offices.
4. Are ledgers maintained in main office for branches?
5. Obtain full information in regard to the source of the margin clerk's information.
   (a) When and where is it obtained?
6. How many copies of the execution order are prepared in the order room and what becomes of them?
7. Ascertain whether a purchase and sales book are maintained in addition to the blotter.
8. Are notices prepared by a separate clerk?
9. Is entry on blotter extended at time it is first made?
10. What kind of notice is sent to customer, unit or collective items of transactions?
11. Are notices sent on cash dividends and journal entries as well as purchases and sales?
12. Is a notice prepared for every purchase and sale?
13. Ascertain full information in regard to the source from which stock ledger clerk obtains notice of the transaction.
14. How are branches notified of their transactions?
15. Are unit posting media used?
16. Ascertain full information as to how the following are controlled:
    (a) Money.
    (b) Securities.

(c) Ledgers.
(d) Postings.

17. Is a take-off used?
    (a) Whose function is it to maintain the take-off?
    (b) Does the take-off serve as a control?
18. Do the execution orders come from wire room complete showing split-up of orders by customers and brokers?
    (a) If not, when are they completed?
19. Are statements furnished in duplicate, and when?
20. When and how are interest calculations applied to accounts?
21. Are statements prepared by statement clerks during the month or at the end of the month?
22. Are corrected notices sent out when transactions are found to be wrong, or is transaction merely adjusted?
23. Do customers receive receipts for cash?
24. Obtain full information as to the authority of disbursing cash or check to customer, and how is it performed?
25. Do customers receive notice of cash paid to them?
26. How many clerks are employed on ledger work, and do they write their own statements?
27. Ascertain whether ledger clerks devote entire or part time to ledger work.
28. Ascertain full information as to when ledgers are posted, and for what day's work.
    (a) Day of trade.
    (b) Day of settlement.
    (c) Day after.
29. Obtain data as to the manner in which ledgers are split up.
30. Ascertain full information as to whether boookkeepers post before control is completed.
    (a) If so, what happens if a posting medium is changed?
31. How many persons are employed in various accounting routines?
    (a) Male and female.
    (b) Number of hours devoted by each to each class of work per day.
    (c) Total salaries paid.
32. Obtain copies of all forms and records with sample entries completely made.
33. Note any additional information that may prove helpful.

Insurance

This class of enterprise may be subdivided in two divisions, home office and agency. Unlike most other business endeavors, insurance companies have nothing tangible to sell; their function is purely that of service. It would not be practicable to attempt to include in the limited space of this volume all possible routine surveys for machine installation applicable to the numerous home office accounting requirements and routines of risk recording.

Agency records, activities, and accounting requirements are not as complicated as the accounting ramifications of home offices. In the analysis of insurance agencies the following general queries are suggested and should prove helpful to the examiner.

I. Accounts Receivable—Direct Business Received (From the Assured):
   1. Ascertain method of invoicing or billing.
      (a) Number of invoices per day.
         (1) Heavy.
         (2) Average.
      (b) Average number of items per invoice.
      (c) How many copies are prepared?
      (d) Ascertain disposition.
      (e) How are invoices written—by hand or machine?
      (f) If by machine, ascertain make and type of equipment used.
   2. Ascertain nature of expiration notice of tickler.
      (a) How is this record written—by hand or machine?
         (1) If by machine, ascertain make and type of equipment used.
   3. How many active accounts are maintained?
      (a) Number of accounts active daily.
   4. Ascertain what style of ledger is used.
      (a) Bound.
      (b) Loose leaf.
      (c) Card.

(d) How written—by hand or machine?
(e) If by machine, ascertain make and type of equipment used.

5. What is the arrangement of accounts?
   (a) Alphabetical.
   (b) Geographical.
   (c) Other (describe).
6. Ascertain the manner in which ledger is divided, and determine number of accounts in each division.
7. What is method of posting?
   (a) Hand?
   (b) If by machine, ascertain make and type of equipment used.
8. Describe posting medium for each class of posting made, and obtain copies of forms used.
9. Is a balance extended on each account after posting?
   (a) If not, determine whether this feature would be desirable.
10. Ascertain whether trial balance trouble has been experienced.
    (a) How often?
    (b) What is the nature of the trouble?
11. Ascertain the date last trial balance was obtained.
12. What proof is established for posting to right account?
    (a) Also correctness of amount posted.
13. Determine maximum number of postings made daily.
    (a) Debit postings:
        (1) Policies written.
        (2) Adjustments, journal entries, etc.
    (b) Credit postings:
        (1) Cash.
        (2) Cancellations and rate adjustments.
        (3) Sundry adjustments, journal entries, etc.
    (c) Total debit and credit postings.
14. When and how are statements written?
    (a) If by machine, ascertain make and type of equipment in use.
15. Are all transactions shown on statements, or only open items?

16. How soon after the end of the period are statements mailed?
    (a) Number of statements sent out.
        (1) Heavy.
        (2) Average.
17. Ascertain what analysis or distribution, if any, is made of revenue.
    (a) Obtain revenue classification.
    (b) Number of units or divisions.
    (c) When and how is it made?
        (1) If by machine, what kind and how many?
        (2) Is analysis in columnar or unit account form?
        (3) Would columnar distribution at right of journals be considered?
        (4) If not, would columnar distribution as a separate operation be considered?
18. How are cash receipts entered in cash book?
    (a) When written?
        (1) If by machine, what kind and how many?
    (b) If cash receipts are not entered in cash book in detail, obtain particulars of method used in summarizing.
    (c) If receipts (from customers) records were written, by carbonization, in process of posting customers' ledger, determine whether the entry of cash receipts, in detail, in cash book could be eliminated.
    (d) What improvements are desired?
19. Ascertain particulars pertaining to:
    (a) Personnel and sex.
    (b) Time devoted by each in the following:
        (1) Invoicing or billing.
        (2) Expiration notice or tickler.
        (3) Orders to outside agencies or brokers.
        (4) Statement work.
        (5) Ledger work.
        (6) Cash receipts.
        (7) Revenue analysis or distribution.
        (8) Other work.
    (c) Total salaries paid by functions.
    (d) Stationery costs per annum.
20. Note any additional information that may prove helpful.

II. Accounts Receivable—Brokers Business Received (i.e., business received from brokers or from agents of other companies which would not, or could not, write the insurance):
1. Use same questions under Part I above.
(a) If any variations, ascertain full particulars thereof.

III. Accounts With Brokers—Placed Business (i.e., business impossible to write, placed with brokers or outside agents):
1. Ascertain the number of orders written per day.
(a) Heavy.
(b) Average.
(c) Average number of items per order.
(d) Ascertain the disposition of orders.
(e) When and how written?
(1) If by machine, ascertain make and type of equipment used.
2. How many active accounts are maintained?
(a) Number of accounts active daily.
3. Ascertain type of system maintained.
(a) Voucher.
(b) Ledger.
(1) Bound.
(2) Loose leaf.
(3) Card.
(c) If voucher, is change to ledger method desirable?
(d) If ledger, what is the arrangement of accounts?
(e) Is an invoice register maintained?
(f) If so, is it prepared before or after audit of invoices?
(g) Are invoices numbered consecutively, and if so, when?
(h) Is a maturity tickler or record maintained?
4. Are accounts receivable from brokers or agents maintained with, and controlled by, the same controlling account as accounts payable to brokers or agents?
(a) If so, are separate accounts maintained for accounts receivable and accounts payable when business is both received from, and placed with, the same broker or agency?
5. Ascertain method of payment.
(a) Is remittance advice used?
(b) If so, does it show all ledger account entries or only items covered by check?

(c) What are payment dates?
(d) How are payments posted?
(1) By hand?
(2) If by machine, what make and type of equipment used?

6. Ascertain whether balance is extended on each account after each posting.
(a) If not, would this feature be considered?
7. Describe posting medium for each class of posting made, and obtain copies of forms used.
8. Is a balance extended on each account after posting?
(a) If not, determine whether this feature would be desirable.
9. Ascertain whether trial balance trouble has been experienced.
(a) How often?
(b) What is the nature of the trouble?
10. Ascertain the date last trial balance was obtained.
11. Determine maximum number of postings made daily.
(a) Credit postings:
(1) Invoices.
(2) Adjustments, journal entries, etc.
(b) Debit postings:
(1) Checks.
(2) Debit memorandums.
(3) Sundry adjustments, journal entries, etc.
(c) Total postings.
12. Describe posting media for each class of postings made, and obtain copies of forms used.
13. Note any additional information that may prove helpful.

IV. Accounts with Companies—Account Current (i.e., accounts with insurance company home offices):
1. Are daily reports rendered to insurance company home offices?
(a) If so, how many copies and what disposition are made?
(b) How written—if by machine, ascertain make and type of equipment in use.
2. How many active accounts are maintained?
(a) Number of accounts active daily.

3. Determine type of system maintained.
   (a) Is accounts current maintained for each class of business with each company which is represented?
   (b) If not, how is the volume of business by classes of insurance determined?
   (c) Are separate records maintained for policies written and for cancellations, or are transactions merged into one record?
   (d) How many different rates of commission are recorded?
   (e) Ascertain whether accounts current forms are furnished by insurance companies.
   (f) If so, determine whether their use is mandatory, or will they accept agencies' forms?
   (g) If companies will accept agencies' forms, what restrictions, if any, are placed on size, data arrangement, etc.
   (h) How many copies of accounts current are prepared?
   (i) Is insurance register written by machine?
      (1) If so, when and how?
   (j) Is a separate register sheet maintained for policies written for each company, or is it consolidated for all companies?
   (k) When are postings made to accounts current?
      (1) Daily.
      (2) Weekly.
      (3) Monthly.
      (4) Other.
   (l) Do accounts current show all transactions with companies?
4. For method of posting see same questions under Part I. If any variations, ascertain full particulars.
5. Determine maximum numbers of postings made daily.
   (a) Credit postings:
      (1) Premiums or policies written.
      (2) Adjustments, journal entries, etc.
   (b) Debit postings:
      (1) Checks.
      (2) Return, premiums, or cancellations.
      (3) Sundry adjustments, journal entries, etc.
   (c) Total debit and credit postings.

6. Describe posting media for each class of posting made and obtain copies of forms used.

V. Personnel, Payroll, and Miscellaneous Data Relating to Routines (Parts III and IV):

1. Ascertain particulars pertaining to:
   (a) Personnel and sex.
   (b) Time devoted by each in the following:
      (1) Orders to outside agencies.
      (2) Remittance advices or vouchers.
      (3) Accounts with brokers.
      (4) Accounts current.
      (5) Check writing.
      (6) Cash book.
      (7) Other work.
   (c) Total salaries paid employees by functions.
   (d) Stationery costs per annum.
2. Note any additional information that may prove helpful.

VI. General Applications:

1. Obtain full particulars of classes of insurance written.
   (a) Percentage of each to total insurance written.
2. How are policies written?
   (a) On what machine?
   (b) How many policies are written daily?
      (1) Average.
      (2) Heavy.
3. How are endorsements written?
   (a) On what machine?
   (b) How many endorsements are written daily?
      (1) Average.
      (2) Heavy.
4. Ascertain the nature and method of maintaining permanent file and tickler records.
   (a) What information do they contain or show?
   (b) How are tickler records written?

VII. Salesmen's Commissions:

1. Use same questions under Part I above.
   (a) If any variations, ascertain full particulars thereof.

VIII. Personnel, Payroll, and Miscellaneous Data Relating to General Applications and Salesmen's Commissions (Parts VI and VII):

1. Ascertain particulars pertaining to:
   (a) Personnel and sex.
   (b) Time devoted by each in the following:
      (1) Policy writing.
      (2) Endorsement writing.
      (3) Permanent file or ticket records.
      (4) Daily report to home office.
      (5) Remittance advices or vouchers: *a.* salesmen's commissions; *b.* vendors' accounts.
      (6) Ledger record work: *a.* salesmen's commissions; *b.* vendors' accounts.
      (7) Check writing: *a.* salesmen's commissions; *b.* vendors' accounts.
      (8) Cash book.
      (9) Expense analysis or distribution.
      (10) Other work.
   (c) Salaries paid to employees by functions.
   (d) Stationery cost per annum.
2. Note any additional information that may prove helpful.

Real Estate Agencies

In the analyses of rental records of real estate agencies, the following general queries are suggested, and should prove helpful to the examiner.

I. Tenants' Records:

1. Ascertain what style of ledger is used.
   (a) Bound.
   (b) Loose leaf.
   (c) Card.
   (d) How written—by hand or machine?
      (1) If by machine, ascertain make and type of equipment in use.
2. How many accounts are maintained?
3. Determine maximum number of postings made daily.
   (a) Debit.
   (b) Credit.

4. How is posting done?
   (a) By hand?
   (b) If by machine, ascertain make and type of equipment in use.
5. Ascertain the nature of posting media used.
6. Is balance extended in each account after posting?
   (a) If not, ascertain whether this feature would be desirable.
7. Ascertain method used to prove accuracy in posting to right account.
   (a) Also correctness of amount posted.
8. Determine what improvements are desired.
9. How many clerks are employed on tenants' records?
   (a) Male and female.
   (b) How many hours per day are devoted by each?
   (c) At what time is work begun and completed daily?
   (d) What are the total salaries paid?
10. Note any additional information that may prove helpful.

II. Landlords' Records:

In addition to obtaining answers to questions 1 to 8 above as applying to this routine, the following questions should be listed among those to be asked by the one making the survey:

1. Are entire month's transactions included in month's postings?
   (a) If not, on what day do the books close?
2. How often are remittances received from agents?
3. Ascertain whether the statements from agents show tenants' balances.
4. Ascertain whether rental periods end at various times, or coincide with calendar months.
5. Ascertain particulars pertaining to:
   (a) Personnel and sex.
   (b) Time devoted by each to this routine.
   (c) Total salaries paid.
   (d) Stationery costs per annum.
6. Note any additional information that may prove helpful.

III. Other Activities:

1. Ascertain whether an insurance department is maintained.
2. Determine whether the following activities are included and

are a part of the business of the company under examination:

(a) Do they act as real estate brokers?
(b) Do they engage in construction or development operations?
(c) Do they own and operate any properties?
(d) Ascertain other activities, if any.

Public Service Corporations (Gas, Electric, and Water Companies)

In all public service corporations the activities of purchasing, recording of stock and supplies, payrolls, and miscellaneous merchandise sales are so similar to those discussed for mercantile and manufacturing companies that to go into those phases would be merely repetition. Since the billing for consumption of gas, electricity, or water is performed better by machine than by hand, the following questions for this specific routine should prove helpful to those making such surveys:

1. Ascertain whether machines are being used.
   (a) If so, ascertain make and type of equipment and production obtained.
2. Obtain full information in regard to the number of consumers:
   (a) Electricity.
   (b) Gas.
   (c) Water.
3. Ascertain the number of bills prepared.
   (a) Monthly.
   (b) Bi-monthly.
   (c) Quarterly.
4. Are electric and gas charges shown on same bill?
5. How many combination electric and gas bills are written?
6. Determine whether meters are read continuously.
7. Ascertain whether bills are rendered continuously or at stated intervals.

8. Ascertain the number of steps in the general rate for:
   (a) Electric.
   (b) Gas.
   (c) Water.
9. Determine the number of consumers on residence rate.
   (a) Electric.
   (b) Gas.
   (c) Water.
10. Determine the number of consumers on power rate.
   (a) Electric.
   (b) Gas.
   (c) Water.
11. Determine the number of consumers on special rate.
   (a) Electric.
   (b) Gas.
   (c) Water.
12. Determine the average number of rate steps earned by consumers.
   (a) Electric.
   (b) Gas.
   (c) Water.
13. Determine the number of merchandise accounts.
14. Ascertain whether merchandise transactions are billed with monthly bill or separately.
15. Determine the number of electric bills that show a constant other than one.
16. Ascertain full information in regard to the required segregation for revenue analysis.
17. Determine the time that elapses between reading meters and bill preparation.
18. Is consumption checked before or after billing?
19. Is consumption extended in meter book?
20. Are cash items posted to ledger?
21. Are sundries shown on bills?
   (a) Arrears.
   (b) Determine the percentage of unpaid accounts for each month.
22. Obtain data in regard to:
   (a) Number of persons employed in the routine.
   (b) Male and female.

(c) Hours per day devoted by each and class of work.
(d) Total salaries paid.

23. Obtain copies of all forms and records with sample entries completely made.
24. Note additional information that may prove helpful.

Railroad, Steamship, and Express Companies

The range of accounting activities in these types of public service companies offers a wide and diversified field for the constructive accountant. Since the general accounting requirements are similar to those outlined for commercial enterprises, the authors deem it expedient to discuss only the accounting required in connection with routines of interline abstracting, which is one of the many phases of accounting in which refinement can be made through the adoption of mechanical methods. In such surveys the examiner will find the following general queries helpful:

1. Ascertain the number of waybills that are abstracted monthly.
2. Determine the approximate cost per 100 waybills for abstracting.
3. Obtain full particulars as to whether station agents prepare daily or weekly reports of waybills received.
4. When are road stations balanced?
5. When are road settlements made?
6. Ascertain the time it takes to balance and check road settlements.
7. Obtain full information in regard to the number of persons (male and female) employed in such work, and the total amount of salaries paid.
8. Obtain copies of all forms and records with sample entries completely made.
9. Note any additional information that may prove helpful.

The Method of Reporting Results of Surveys and Proposed Methods

Regardless of whether the individual making the survey is a professional constructive accountant or an accounting

executive, he should present a report containing full details of his findings and proposed new methods in the following manner:

1. A general statement as to the purposes and scope of the survey.
2. A complete explanation of proposed new methods or changes in the existing system.
   (a) Scope of the proposed plan.
   (b) Operative routine of every accounting condition, with complete written instructions accompanied by diagrams.
   (c) A definite description of the duties of each clerk under the proposed plan, and method of performance.
   (d) Necessary accounting control for the mechanical accounting equipment recommended.
   (e) Full explanation of the operation of equipment recommended to handle every accounting condition, including details concerning the requirements for preparation of media before machine application.
3. A full and comprehensive statement as to the advantages and chief points in support of the proposed methods as compared with present methods.
4. An explanation in detail of all equipment recommended in the proposed plan, and the approximate savings to be effected if adopted.
   (a) Various types of mechanical accounting equipment recommended.
   (b) Investment involved.
   (c) Estimated net annual savings.
   (d) Basis of estimate.
5. Description of forms recommended in plan:
   (a) Sample forms to be used, drawn in their actual working size in accordance with machine dimensions, and with their proper rulings and headings inserted.
   (b) An explanation in detail in regard to the action of all forms exhibited.
6. General statement concerning the value of the proposed plan, and such other comments as are deemed necessary.

After the above information has been presented and sufficient consideration has been given to the scope and purpose of the proposed plan by the management, it is advisable that a conference be held wherein additional information may be given such points of the plan that are not sufficiently clear. It is also essential that all differences of opinion and doubts in the minds of the executives responsible for the successful operation of the proposed plan be adjusted before actual installation is made. Failure to give proper consideration to all of the factors outlined above has often resulted in the condemnation of many excellent accounting systems before their performance has been given a fair trial.

CHAPTER VIII

INSTALLMENT ACCOUNTING

Factors Involved in the Analysis of Installment Sales Accounts.—In certain lines of businesses sales are made or contracts are executed, under the terms of which payments are to be made at specific intervals or are payable in installments. Where installment sales are the major feature of merchandising, the real cost of operative accounting methods and requirements presents a very important problem. Since it takes more working capital for a business to sell merchandise on installments than on open account, the growth of installment accounts should be watched in comparison with other classes of sales or terms, and should be subjected to analysis periodically on the following basis:

1. The number of accounts with unmatured (not due) payments, their amounts, and total.
2. The number of accounts with matured (due) payments, their amounts, and total, divided as to:
   (a) Current installments due.
   (b) Other installments past due.

To have the above information in readily available form under pen methods is almost prohibitive from the standpoint of operative accounting costs where a large volume of accounts is maintained. In addition to maintaining operative accounting methods that will permit adequate analysis of the condition of installment accounts, the question that deserves serious consideration in the design and installation of proper accounting methods and their requirements, is the point at which the profit should be taken where the installment plan of merchandising

is adopted. There are three policies which may be followed, each of which is largely dependent upon the conditions under which the sale or contract is executed:

1. Upon consummation of the sale.
2. Proportionately when collections are made.
3. Upon final installment when collected, i.e., the profit is set up when the last payment is collected.

In view of the above factors the need for maintaining proper accounting methods that will assure control of accuracy and logical routine deserves serious consideration. In reality the profit on installment sales is realized only when the last payment is received. This, however, is not a practical basis for most concerns to consider. To set up the profit as soon as the sale is made would not be practicable unless consideration is given to all necessary carrying charges, collections, and reclamations which should be provided for through the creation of ample reserves. Where a large volume of installment accounts is handled, the best and most practical basis is to set up profits in the proportion that collections are realized.

Different Methods in Use.—There are a number of different methods in use for accounting for installment sales, but the most common, and probably the most satisfactory method, has the following features:

1. Recording at the time of the sale, the full amount thereof, the sales account opened being more or less of a memo since it is not used in profit-determining statements, but is treated in the nature of a deferred credit to the profit and loss account.

2. Recording at the time of the sale, the full amount thereof as a receivable, and maintaining such receivable accounts as separate and distinct from those for recording amount due on sales made on open accounts.

3. Transferring at the time of the sale, merchandise stock to an account which should show continuously the unconsumed portion of the cost of merchandise sold on installment.

4. Transferring from the memo sales account to the regular sales account the proportion of the monthly collections applicable to installment receivables, and from the cost account to the cost of sales the monthly proportionate share of the total cost of the merchandise represented by such collections.

5. Crediting of payments to the installments receivable account.

Extreme care should be made in the analysis not only of those sales made on approval, but also of the amount of sales which are cancelled by the return of merchandise. In publishing houses it has been found practicable not to open an account for each book sold, except where the customer has a charge account. No record is made on the general accounting books until payment is made or the customer has signified his intention of keeping the merchandise.

Two Applications Found Most Practicable.—Under pen methods there are two applications of installment accounting in general use. Either the customer is given the original of a receipt prepared in duplicate for the purchase, or a passbook is given to the customer wherein the purchase is credited and a record is made on a cash sheet. Since the customer's ledger account is not posted when the original entry is made, it invariably happens that such work is deferred, the result of which is often the cause of a loss of time and effort in bringing posting work up to date, or an accumulation of such work especially during peak periods. The fact that the posting operation is in arrears and must be hastened to completion tends to cause inaccuracies. It is common knowledge that under pen-kept methods a considerable amount of time is consumed in proving, balancing, and checking for errors—all unproductive and costly functions.

The problem of keeping installment ledgers posted to date and accurately balanced under pen methods is further complicated largely because the original entries are illegibly written, making it difficult to eliminate errors in crediting the proper

accounts and the payments applicable. Hence, neither the installment house merchant nor the customer is assured that their records are in agreement, which leads to disputes and often a loss of future business. Pen-kept methods of ledger posting, if not kept up to date and properly balanced, will not give the necessary information as to the condition of the accounts, collections, and total outstanding that is so important to the management of businesses concerned with installment accounts.

Advantages of Preparing Records Simultaneously in One Operation.—Under machine methods all accounts are posted to date and are accurately balanced, thereby preventing disagreements with customers, providing complete daily control of all transactions, and eliminating the weaknesses of pen-kept methods. The customer's passbook and the office ledger record may be posted simultaneously by machine. The customer is thus assured that proper credit is being given and that his record and the store record are identical, thus eliminating disputes in this regard. Since both the ledger card and passbook are posted simultaneously in one operation on the machine, there is absolute assurance that the customer's record is in agreement with the business office record.

One of the outstanding advantages of mechanical methods is that all customers' accounts are posted to date, and the time formerly required in posting the ledger at a later date by hand with chances of error is entirely eliminated. The fact that the accounts are always up to date greatly aids collections, affording the credit department the readily available information so urgently needed to follow up delinquent accounts promptly.

Another advantage of mechanical over pen-kept methods is that all postings are made in clear legible type. In addition to making proper entry on the customer's passbook and the office ledger record, there are certain types of machines that will produce a record of all postings and their accumulated totals during the process of posting without additional effort, that

may be used for permanent reference and for proving the correctness of the work performed.

Accounting machines equipped with a flat-printing platen will produce in this class of work a slip or voucher to be inserted and printed upon whenever desired. The same entry that is machined on other records may be printed on the inserted slip simultaneously when such entry is made. Consequently four original records may be printed at one time, viz.

1. Passbook.
2. Ledger record.
3. Audit sheet (chronological record of all entries made).
4. Voucher or slip used in merchandise returns, sales analysis, etc.

If a credit, in the case of a return of merchandise which is to be used later as a posting medium for stock records, or a paid-out voucher, sales ticket, or other record is to be certified as evidence that the transaction was posted, such credits, vouchers, etc., may be inserted into the machines, which will print thereon the transaction without additional effort. The accuracy of the entry and the control over transactions as established by machine methods with the least amount of effort and cost are other features that should be regarded as very important in installment accounting.

The accuracy of installment accounts kept under mechanical methods may be summarized as follows:

1. Unchangeable printed figures on all records promote accuracy and prevent mistakes.

2. The office and customers' records being prepared simultaneously are identical. Only one record need be proved to establish the accuracy of all records so prepared.

3. Each account is posted by the same person handling the transaction, thus eliminating errors in posting due to misread and illegible figures.

4. The customer is made the inspector of the recording of his

own account, which practically, if not entirely, eliminates the chance of error and dispute.

5. Customers' requirements are handled faster than under pen methods, due to the many automatic features which are provided by most machines adaptable to this class of accounting.

6. A more accurate and satisfactory service to the customer is afforded than under pen-kept methods.

7. Amounts of every transaction are accumulated by the machine proving the correctness of the work. Should an error be made, it is quickly detected and adjusted. All work is proved each day, and office ledgers are in balance at all times because balances are automatically computed and printed during the process of posting.

The application of mechanical methods to installment accounting conditions provides the following advantages:

1. Mechanical control and visual inspection of all transactions.

2. Each figure that has been recorded has also been accumulated properly at the time of entry, which furnishes control information with regard to all transactions.

3. Fewer accounts become delinquent because all accounts are up to date, which affords a means of notifying customers immediately in the event of delinquency.

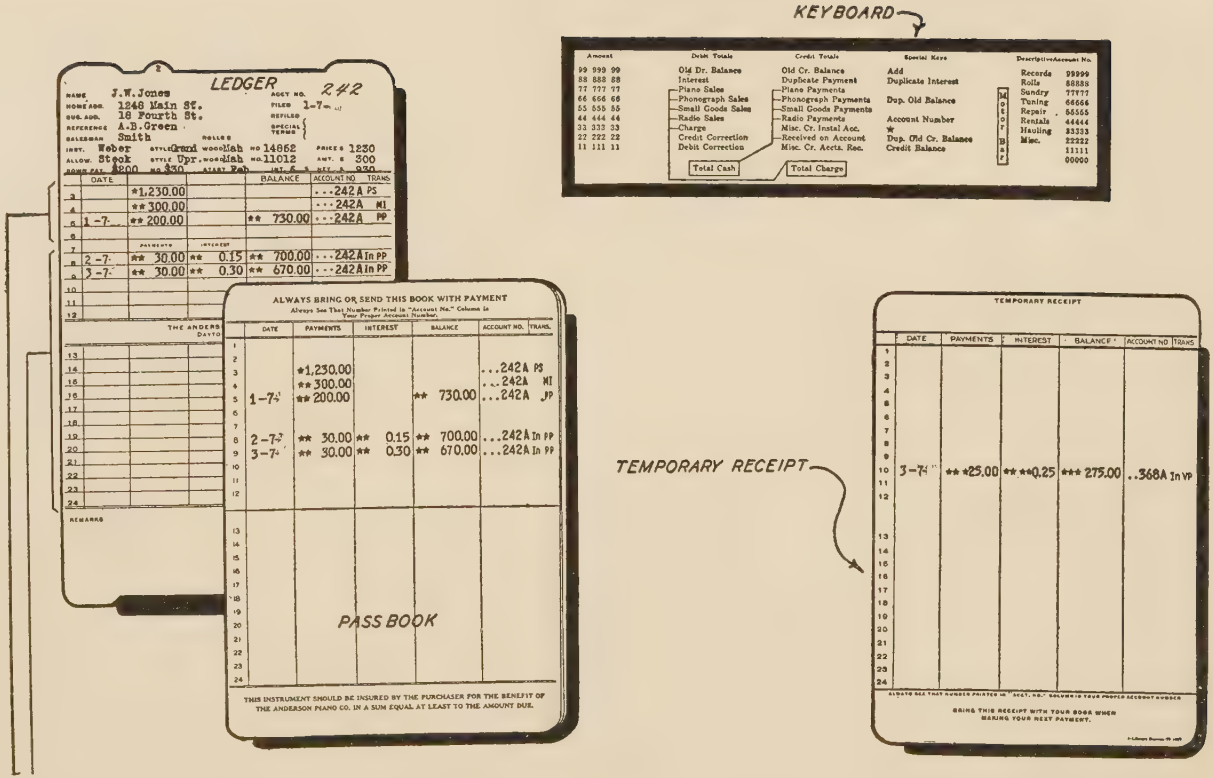
From the standpoint of time saving and efficiency in operative accounting phases of installment accounting, the mechanical method affords:

1. The saving of considerable time by posting all records simultaneously.

2. Mechanical features of machines adaptable to installment accounting conditions, making posting easy and speedy, thus requiring fewer employees in the maintenance of necessary records.

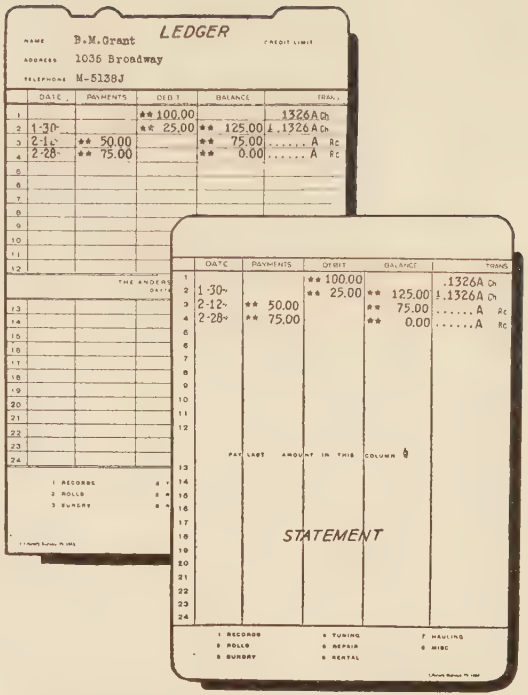
3. Complete daily information is automatically provided at the close of each day without additional effort.

Simplified System of Installment Accounting.—The routine as shown in Figure 11, is a procedure that may be


KEYBOARD
Amount
99 999 99
88 888 88
77 777 77
66 666 66
55 555 55
44 444 44
33 333 33
22 222 22
11 111 11
Debit Totals
Old Dr. Balance
Interest
Piano Sales
Phonograph Sales
Small Goods Sales
Radio Sales
Charge
Credit Correction
Debit Correction
Total Cash
Credit Totals
Old Cr. Balance
Duplicate Payment
Piano Payments
Phonograph Payments
Small Goods Payments
Radio Payments
Misc. Cr. Instal Acc.
Received on Account
Misc. Cr. Accts. Rec.
Total Charge
Special Keys
Add
Duplicate Interest
Dup. Old Balance
Account Number
Dup. Old Cr. Balance
Credit Balance
Motor Bar
Descriptive Account No.
Records 99999
Rolls 88888
Sundry 77777
Tuning 66666
Repair 55555
Rentals 44444
Hauling 33333
Misc. 22222
11111
00000
LEDGER 242
NAME J.W.Jones
HOME ADD. 1248 Main St.
BUS. ADD. 18 Fourth St.
REFERENCE A.B.Green
SALESMAN Smith
INST. Weber STYLE Grand WOOD Ash NO 14862 PRICE $ 1230
ALLOW. Stock STYLE Upr. WOOD Ash NO 11012 AMT. $ 300
DOWN PAY. $200 NO $30 START Feb INT. % 6 DEF. $ 930
ACCT NO.
FILED 1-7
REFILED
SPECIAL TERMS
ROLLED
DATE
BALANCE
ACCOUNT NO TRANS
*1,230.00 ...242A PS
**300.00 ...242A MI
1-7 **200.00 ** 730.00 ...242A PP
PAYMENTS
INTEREST
2-7 ** 30.00 ** 0.15 ** 700.00 ...242A In PP
3-7 ** 30.00 ** 0.30 ** 670.00 ...242A In PP
THE ANDERSON DAYTON
REMARKS
ALWAYS BRING OR SEND THIS BOOK WITH PAYMENT
Always See That Number Printed in "Account No." Column is Your Proper Account Number.
DATE
PAYMENTS
INTEREST
BALANCE
ACCOUNT NO.
TRANS.
*1,230.00 ...242A PS
**300.00 ...242A MI
1-7 **200.00 ** 730.00 ...242A PP
2-7 ** 30.00 ** 0.15 ** 700.00 ...242A In PP
3-7 ** 30.00 ** 0.30 ** 670.00 ...242A In PP
PASS BOOK
THIS INSTRUMENT SHOULD BE INSURED BY THE PURCHASER FOR THE BENEFIT OF THE ANDERSON PIANO CO. IN A SUM EQUAL AT LEAST TO THE AMOUNT DUE.
TEMPORARY RECEIPT
TEMPORARY RECEIPT
DATE
PAYMENTS
INTEREST
BALANCE
ACCOUNT NO
TRANS
3-7 ** *25.00 ** **0.25 *** 275.00 ..368A In VP
BE SURE TO SEE THAT NUMBER PRINTED IN "ACCT. NO." COLUMN IS YOUR PROPER ACCOUNT NUMBER
BRING THIS RECEIPT WITH YOUR BOOK WHEN MAKING YOUR NEXT PAYMENT.

ALL ENTRIES AFFECTING THE ORIGINAL TRANSACTION SUCH AS, THE PURCHASE PRICE, ALLOWANCE, AND DOWN PAYMENT, ARE POSTED ON LINES 3 TO 6 OF THIS CARD.

LINES BELOW LINE 7 ARE USED FOR POSTING INSTALLMENT PAYMENTS.



ROUTINE OF

COMBINED INSTALLMENT AND CHARGE ACCOUNT ROUTINE

Figure 11. Combined Installment and Charge Account Routine

adopted by installment houses for posting and controlling installment accounts. The type of equipment upon which the records exhibited are machined is printing equipment having a flat-printing platen, which offers the following advantages:

1. Posting the office ledger record and customers' receipt book are performed at one operation.
2. Individual totals of each class of charge and each class of credit are automatically accumulated.
3. It provides a detailed record of the day's business in the form of an audit sheet, which reflects each transaction introduced into the machine.
4. It also provides a means for proving the accuracy of the records.
5. It records and assures the receipt of all moneys applicable to the installment accounts.

The equipment used is provided with eighteen control totals and two group totals. One group total accumulates the total cash transactions, and the other accumulates the total charge transactions. Each total has an accumulating capacity of one cent less than a million dollars. The special keys in row 1 of the keyboard illustrated are used to obtain complete records of all transactions handled.

Procedure of Recording to Installment Accounts.—For an installation of this type separate controls for piano, phonograph, small goods, (i.e., accessories), radio and charge accounts, etc., are furnished. The machine provides separate totals for both debits and credits for each control, with the exception of miscellaneous credits, which are recorded on the proper miscellaneous credit total and are analyzed later. A sales analysis record may be kept in more detail as a separate and distinct operation, and may be maintained with the same division of controls produced by the machine. By reference to the illustration, it will be observed that the keys in the left-hand row of the number-printer are used chiefly in connection

with the charge total to describe various kinds of transactions. These keys print 1, 2, 3, 4, 5, 6, 7, and 8, and represent Records, Rolls, Sundry, Tuning, Repair, Rentals, Hauling, and Miscellaneous. At the end of the day the charge total is analyzed by means of the sales slips to obtain the various classifications it contains. The remaining rows of number-printer keys are used to print numbers.

If the cashier posts to a customer's account and finds that the account number has been omitted, ordinarily it would seem that there would be no way of printing the number on the line to which the posting was made. The equipment used in this system is provided with an account number key in row 1, which selects the account number column. This key is then depressed in connection with the account number keys on the number printer, and the printing is made on the desired line.

The interest total is used to record the amount of all interest received. Under the system being dealt with, interest received is not analyzed by departments but is kept by one control.

The cashier's key attachment on the machine provides a means of identifying the cashier and any other persons using the machine, with the transactions handled by each. The machine cannot be operated until one of these keys is inserted and it prints an identifying symbol on the records.

The machine is provided with a sliding table or flat platen to hold two forms. On installment accounts, these two forms are the passbook and ledger card, and on open accounts they are the statement and ledger cards. The machine prints a complete record of each transaction upon both forms. Both printings are originals, as no carbon paper is used with this type of equipment.

A complete chronological record of all transactions in the order of their occurrence is printed automatically on the visible audit sheet inside the machine. This audit sheet shows the

same information as is printed on the ledger card and passbook, or ledger card and statement, with the exception of the date. All totals, when they are read or cleared, also appear on this sheet. At the end of the day, the audit sheet or journal record is removed from the machine and filed as a permanent record.

An upper slip printing table is provided on the machine to certify memorandums, discount vouchers, etc. The inserted form is certified with the same printing as appears on the audit sheet, plus the date.

Recording of Installment Sale.—When a customer purchases a piano, for example, and wishes to pay for it in installments, the salesman first makes out a sale slip and has the customer sign a chattel mortgage. The salesman then brings the mortgage and sale slip, together with the amount paid down, to the cashier's window. A ledger card and passbook are then filled out, and the account is given a number.

. The ledger card is different than usual in that the original transaction is posted on lines 3 to 6, inclusive, including the purchase price, allowance, down payment, and any other entry affecting the account at the time of purchase. The lines below line 7 are used for posting installment payments. This portion of the card affords a clear division of the original transaction from the payments, as the purchases are in column 2 above line 7, and the payments are in column 2 below line 7.

The cashier takes up the ledger card and passbook, sets up the account number on the number-printer keys, the amount on the amount keys, inserts the ledger card and passbook on the sliding table of the machine, locates the first line on each by means of the line-finding device, and finally depresses the "Piano Sales" key and the motor bar to operate the machine.

The amount is added on the "Piano Sales" total, and on the "Total Charge" group total. The amount is also printed in column 2 of the ledger card and passbook. The account

number and the symbol "PS" are also printed on both records. The same record is printed on the visible audit sheet inside the machine.

Recording the Down Payment.—The cashier locates the second line on the card and book by means of the line-finding device, and next sets up the account number on the number-printer keys, and records the amount allowed using the "Misc. Cr. Install. Acc." key. The amount paid down is then recorded, using the "Piano Payments" key on both registrations. The amount is also printed in column 2 of the card and passbook, the same column in which the amount of the sale was printed. The new balance is then automatically extended and printed in the balance column. On this operation, the date is automatically printed on the card and passbook. The passbook is then given to the customer with instructions to present it each time a payment is made. The ledger card is filed by account number in the card file.

How Deferred Payments Are Recorded.—Where this system has been adopted, 75% of the sales are made on the deferred payment plan. About 90% of the customers' remittances are made by mail and the balance by store visit by the customers. When payments are made by mail, the passbook is sent in with the remittance and is returned to the customer after payment has been recorded. Whenever an account becomes delinquent, either in principal or interest, a special card is made out with the customer's name, address, and the amount due, and is placed in front of the ledger card for the collector's attention.

When a customer visits the store to make a payment, the passbook is presented to the cashier, together with the amount of the payment plus interest. Guided by the account number shown on the passbook, the cashier removes the ledger card from the file. Comparing name and address, also the last

balances on the two forms for the purpose of avoiding posting to wrong account, the payment is recorded in the following manner. The old balance is introduced into the machine, using the "Old Dr. Balance" total. The account number is then set up on the number-printer keys; the amount on the amount keys, the ledger card and passbook are inserted on the sliding table; the writing position is selected by means of the line-finding device; the proper department payment key is depressed with the motor bar which operates the machine. The cashier then records the amount of the interest on the "Interest" total. The new balance is automatically extended, at which time the date of payment is printed. The amount of the payment is printed in column 2, and the amount of the interest in column 3 of the ledger card and passbook. The passbook is then returned to the customer. The ledger card is placed in an offset position until the postings for the entire run have been proved, after which they are refiled.

Preparation of Temporary Receipts in Absence of Passbooks.—In the event that the customer wishes to make a payment and neglects to bring the passbook, the cashier uses a temporary receipt to replace the passbook. The temporary receipt is inserted in the sliding table with the ledger card, and the payment and interest are recorded as just explained. The customer is then told to bring the temporary receipt together with passbook when making next payment, at which time the temporary receipt is taken up and the amount of the payment is posted in the passbook, using the "Duplicate Payment" key. The interest is recorded in the passbook, using the "Duplicate Interest" key to identify the transaction.

Where this system has been adopted, 25% of the accounts are 30-day accounts. A different kind of ledger card, together with a statement, is provided to handle these accounts. At the bottom of the ledger card and statement is shown an index which explains the type of the transaction. These forms have

columns for the date, credit, debit, balance, sale number, and transaction.

How Charge Accounts May Be Handled on Same Equipment.—When a customer makes a purchase and wishes to have it charged, the salesman prepares a sales slip in detail. At the end of the day all the charge slips are sent to the cashier. A ledger card and statement are then headed up for each new account after credit has been passed therefor. The cashier then records each charge in the following manner. If the charge includes an item described in the left-hand row of the number-printer keys, for example, a purchase of phonograph records, the "Records" key is depressed. The sales number shown on the sales slip is then set up on the account number keys; the amount on the amount keys, the ledger card and statement are inserted in the sliding table; the first line on both is selected by means of the line-finding device; the "Charge" key is depressed; and the posting is completed by touching the motor bar which operates the machine. The new balance is automatically extended. Both the card and statement are printed with the date, the amount of the purchase, the new balance, symbol for records, the sale number, and the transaction symbol. When money is received on a 30-day account, the card and statement are again posted in a similar manner, this time using the "Received on Account" total.

Merchandise credits and allowances, discounts, and any other adjustments on installment accounts are recorded on the "Misc. Cr. Install. Acc." total. All adjustments on open accounts are recorded on the "Misc. Cr. Accts. Rec." total. These transactions are few in number and these two totals are quickly analyzed at the end of the day. A voucher or memo is made out for each of the transactions by means of the slip-inserting device with which the machine is equipped.

The "Debit Correction" and "Credit Correction" totals

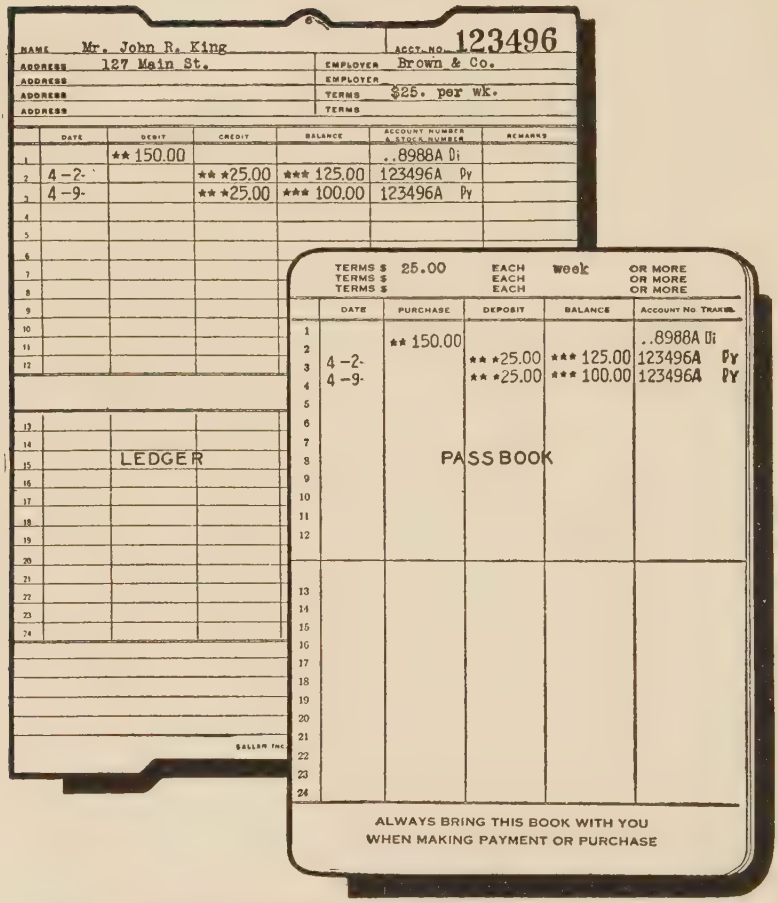
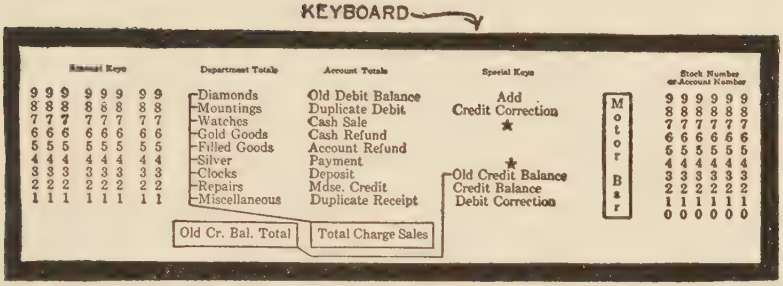

NAME Mr. John R. King
ACCT. NO. 123496
ADDRESS 127 Main St.
EMPLOYER Brown & Co.
ADDRESS
EMPLOYER
ADDRESS
TERMS $25. per wk.
ADDRESS
TERMS
DATE DEBIT CREDIT BALANCE ACCOUNT NUMBER & STOCK NUMBER REMARKS
1 ** 150.00 ..8988A Di
2 4-2- ** *25.00 *** 125.00 123496A Py
3 4-9- ** *25.00 *** 100.00 123496A Py
LEDGER
TERMS $ 25.00 EACH week OR MORE
TERMS $ EACH OR MORE
TERMS $ EACH OR MORE
DATE PURCHASE DEPOSIT BALANCE ACCOUNT No. TRADE
1 ..8988A Di
2 ** 150.00
3 4-2- ** *25.00 *** 125.00 123496A Py
4 4-9- ** *25.00 *** 100.00 123496A Py
PASS BOOK
ALWAYS BRING THIS BOOK WITH YOU
WHEN MAKING PAYMENT OR PURCHASE

Figure 12. Installment Pass Book, Ledger Sheet, and Daily Record with record on page 223 is prepared simultane



DAILY RECORD

	DATE	CONTROL TOTALS	AMOUNTS	No of Trans Symbols	REMARKS
1	4-2-	Diamonds	**1,125.00	...7..A Di	
2	4-2-	Mountings	***45.00	...5..A Mt	
3	4-2-	Watches	***245.00	..11..A Wa	
4	4-2-	Gold Goods	***104.00	..15..A GG	
5	4-2-	Filled Gold	***96.00	..19..A FG	
6	4-2-	Silver	***10.00	...4..A Sl	
7	4-2-	Clocks	***20.00	...3..A Cl	
8	4-2-	Repairs	****5.00	...1..A RP	
9	4-2-	Miscellaneous	***90.00	. 27..A Ms	
10	4-2-	Cash Sales	***410.00	.161..A Cs	
11	4-2-	Deposits	***265.00	..50..A DP	
12	4-2-	Payments	***550.00	.113..A Py	
		Total Cash	1225.00		
13	4-2-	Cash Refunds	****5.00	...2..A CR	
14	4-2-	Account Refunds	****3.00	...1..A AR	
15		Total Deduction	8.00		
16		Net Cash	1217.00		
17	4-2-	Mdse. Credit	****2.00	...1..A MC	
18	4-2-	Old Credit Balances	***370.00	..12..A	—
19	4-2-	Old Debit Balances	**5,450.00	.101..A	
20	4-2-	Duplicate Debits	***20.00	...1..A DD	
21	4-2-	Duplicate Receipts	***125.00	..20..A DR	
22	4-2-	Charge Sales	**1,330.00	..58..A TS	
23	4-2-	Cash Sales	***410.00	..34..A CS	
24		Total Sales	1740.00	92	

Keyboard Arrangement of Flat-Printing Platen Accounting Machine. Daily ously with machine clearance at end of day

are used when a mistake is made in posting, and it is necessary to make a correction by machine.

Recording of Cash Sales.—At the end of the day the total amount of cash sales is brought to the cashier. After the readings of all store registers have been taken by the cashier, a ledger card, headed "Cash Sales," is inserted in the sliding table, upon which the machine records the amount of the cash sales, first on the "Charge" total and then on the "Received on Account" total. This balances the posting and furnishes a control over cash sales on the machine.

Control Established by Proof Sheet Produced by Machine.—The machine totals are cleared and printed on the machine audit sheet at the end of the day. The work is proved by means of the various totals. The sales for each of the five controls are obtained by totaling the sales slips for each, and checking these against the corresponding totals as established by the machine. The check on the money in the cash drawer is obtained by taking the sum of the "Total Cash" group total and the "Interest" total. The "Duplicate Payment" total must agree with the total of the temporary receipts turned in by customers. The check on the other credits is obtained by totaling the slips of each class of credit and comparing the amounts with the corresponding credits obtained through an analysis of the miscellaneous credit totals.

The old debit and credit balances are proved separately. The previous balances on the accounts affected are listed and compared with the total amounts picked up as shown by the "Old Dr. Balance" and "Old Cr. Balance" totals on the machine.

System of Installment Sales Providing for Departmental Sales Analysis.—The routine illustrated in Figure 12 is maintained by a large jewelry installment house. The operative features explained in the preceding routine are similar to those

of this routine, with the exception that the keyboard arrangement is different, as will be seen by referring to the illustration, and all machine totals are cleared and printed on a "Daily Record" card. These totals show the amounts of the sales in the various departments as well as the amounts of the old debit and credit balances, of the duplicate entries, and other amounts affecting the bookkeeping. This daily record, therefore, gives the merchant a sales analysis by departments, as well as a complete control over his accounts receivable and other accounts.

Many splendid applications may be developed on almost every type of equipment dealt with in the book to meet the requirements peculiar to installment accounting conditions. Because of limited space, however, it is impossible to exhibit the many systems that have been adopted and which have produced worthy and effective results.

CHAPTER IX

SALES ANALYSES

Importance of Timely Reports and Statistics of Sales.— Inasmuch as timely reports and statistics revealing the actual trend of sales are essential to business management, they must be readily understood and used effectively to guide and control distribution profitably, economically, and conservatively. Whether selling is done by a local organization, a national organization, or through advertising and mail orders, the following factors of distribution, when properly analyzed, are pertinent to every sale made. It must be remembered that if sales statistics are to be used as a basis for determining sales policies, they must be used while the figures still retain their news value. Therefore, the essential necessity for promptness, together with the absolute need for accuracy, makes the work of analyzing sales conditions an important operative accounting function.

1. Sales by products or commodities, quantity, and value.
2. Sales by customers.
3. Sales returns and allowances by customers and by products or commodities, quantity, and value.
4. Sales by salesmen and territory, showing profitable and unprofitable commodities.
5. Sales by states, counties, towns, and other geographical areas.
6. Sales to various classes of businesses.
7. Sales trend of entire line sold.
8. Commission statements by salesmen, products, geographical or other.

9. The productivity of each salesman and territory.
10. Expenses by salesmen and territories.
11. Cessation or decrease in sales to any one customer or classes of customers by commodities.
12. Stock turnover.
13. Quota analysis.
14. Speed at which commodities are moving.

There can be little question but that the aggressive sales executive must always have a knowledge of existing conditions, procurable at the minimum cost of time and money. A knowledge of who the productive salesmen are; what lines are moving most quickly, or most slowly; what products are meeting with the least resistance; the territories and products yielding the largest volume of sales and profits; the amount of profits realized by salesmen, by classes of merchandise sold; and all other items of information relating to distribution, are the bases on which the accomplishments of a selling organization may be judged. It would be prohibitive to attempt to ascertain under pen methods one tenth of the above data in many firms, due to the voluminous detail existing, but through the introduction of mechanical accounting equipment such data may be compiled with a reasonable degree of accuracy, speed, and economy.

To compile post mortem sales reports which show that something was wrong which could have been remedied had a particular sales situation been known in time, is a self-evident indication that effort and expense would be justified to prevent costly errors in such reports due to lack of complete and timely information. The frequent statement that "our business is different" voices a belief which causes many concerns to handicap seriously their methods of operative accounting and possibly their earnings, the latter especially when prompt and accurate reports may mean the difference between profits and losses in dealing with market conditions, competition, and the following factors:

1. Fluctuations in raw material markets.
2. Length of processing line and many possible variations during these processes.
3. Sudden and varied changes in consumers' demand.

A study of the routine illustrations will demonstrate that proper operative accounting methods involving the use of mechanical accounting equipment not only save clerical expense, but supply vital facts at the precise moment when they are needed, resulting in the following advantages:

1. Centralization of records and elimination of different records kept in different places for the same or similar purposes.
2. Standardization of methods with the advantages of reduction in expense and the possibility to interchange employees.
3. Furnishing the basis for budgeting sales in addition to current statistics covering the vital factors governing distribution.
4. Creation of a general improvement of the sales organization through the accuracy introduced into the recording of distribution facts.

The Punch Card Method.—The functions of tabulating equipment requiring the use of the perforated or punched card have been explained in Chapter II. The usefulness of the perforated or punched card principle is practically without limit, as routines may be designed to provide all essential data required by any industry. Many varied sales analyses can be obtained from the same cards, as will be seen from a study of the sales analysis routine illustrated on page 230. Such analyses can be made with the assurance of absolute accuracy, because the figures are recorded by means of perforations which are not subject to alteration or transposition. Every perforation made on the card has a definite meaning. Perforations are cut into the card by means of a punching machine, which

has from ten to fourteen keys, operated in the same manner as typewriter keys. As the keys for the figures required for each column are touched, the punching machine carriage automatically shifts to the first column of the next heading on the card form.

The holes punched by the punching machine can be made to represent all the important facts of a sales transaction and serve as a basis for any desired report or analysis.

Where figures to be punched are common to several cards, as for example, several pieces bearing the same quality number, these data can be "gang-punched" in as many cards as desired without setting up for the figures again. This method greatly accelerates the speed at which punched cards can be made, since it perforates simultaneously as many as twelve cards with from one to ten perforations. The number of cards punched in a day, however, depends largely upon the skill of the operator, a conservative estimate being 2,000.

For classification a group of these perforated cards is automatically fed into a selection machine known as a sorter, equipped with pins which may be set for any desired selections, sales cards being sorted, for instance, by commodities, states, agencies, salesmen, customers, etc. If it is desired to sort 10,000 cards similar to the "Tire Sales Analysis Card" illustrated in Figure 13, by tire sizes in order to determine the number of each size sold for the accounting period to which the data punched on the card apply, the sorter would be set for the column of the card section allotted to "size."

After the cards have been arranged in their desired sequence, they are ready for tabulation. This is accomplished by placing the cards in a third machine unit, namely the printing tabulator. This machine operates in either of two ways:

1. Prints totals only for each classification.
2. Lists each card in detail and supplies sub-totals with grand totals.

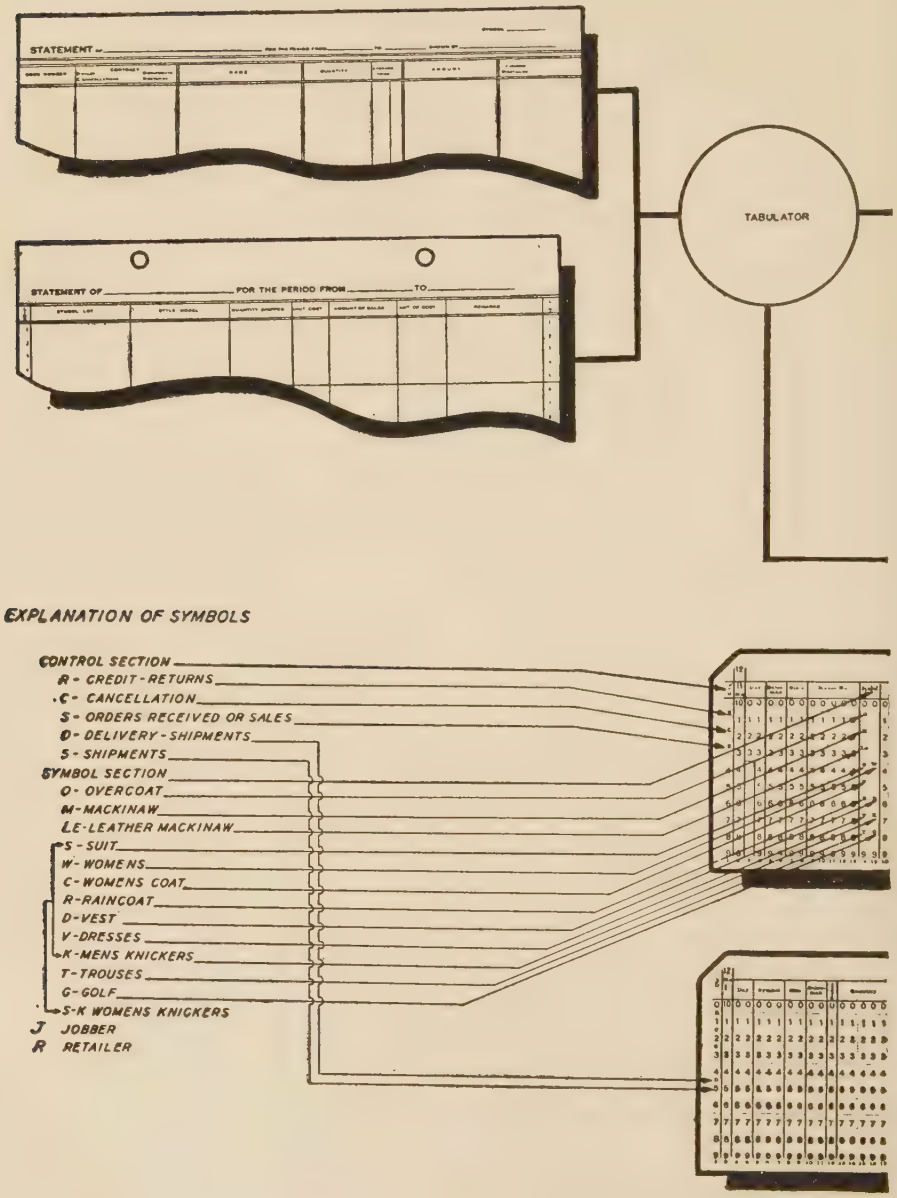
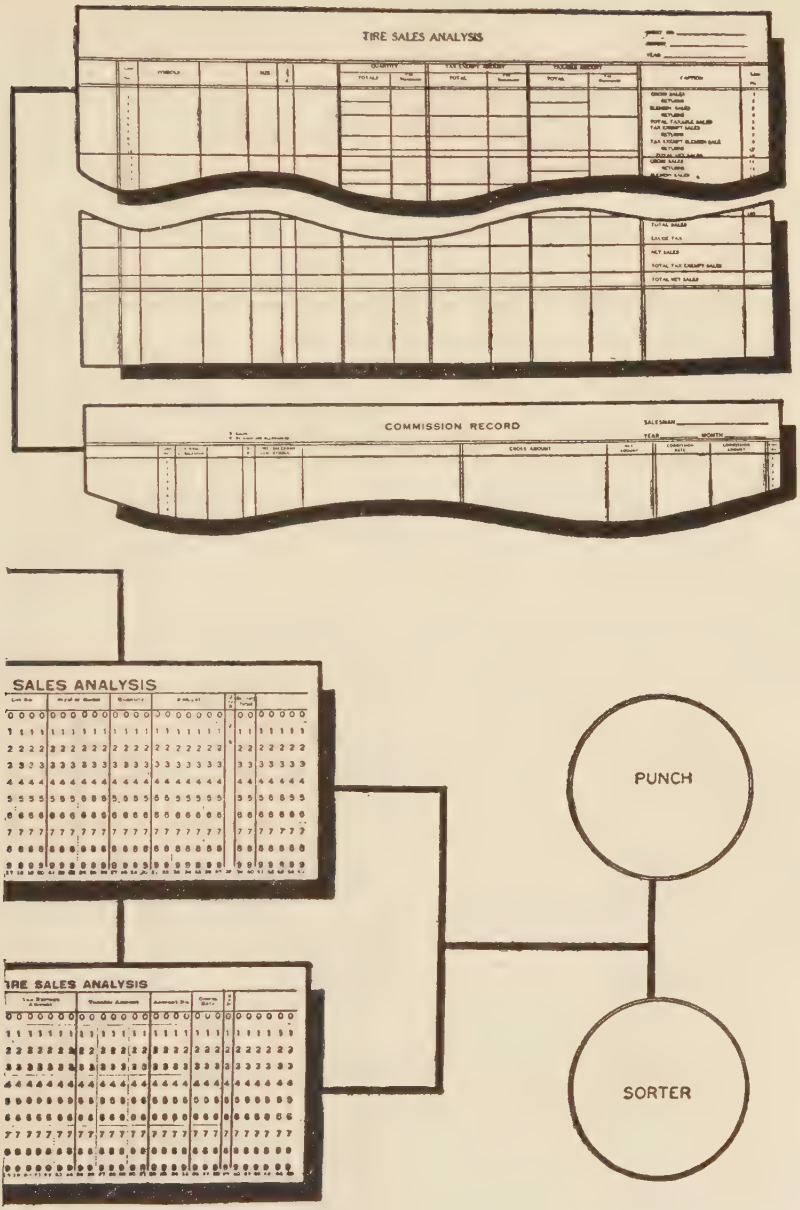


Figure 13. Sales Analysis Routine for



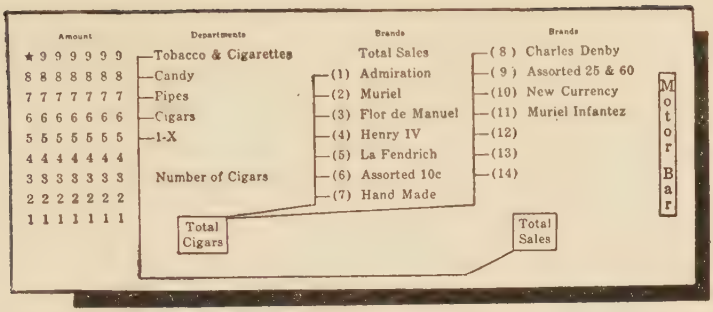
Tire and Tube Manufacturing Company

Stoppage of the machine at the end of groups in order to transcribe totals to report forms, such as those illustrated in Figure 13, is effected by an unpunched card marked "Stop" which is inserted previous to the tabulation.

When detailed analyses are desired, the tabulator may be transformed instantly from a total-printer into a listing machine capable of printing from one to seven itemized groups of figures at the rate of seventy-five cards per minute. The machine likewise is equipped with an automatic control, and adds from two to five columns of figures simultaneously at the rate of one hundred and fifty cards per minute when group totals are desired as required by the compilation of the "Tire Sales Analysis" form illustrated. Four or five copies of forms may be made on the tabulating machine, and copying ribbons may be utilized where it is desired to hectograph copies. Perfect alignment is obtained on any ruled forms so that typewritten or addressograph information may be inserted later if desired.

The Ticket Method.—The equipment used in the sales analysis routine illustrated in Figure 14 is the printing accounting machine capable of producing a ticket in the process of tabulation. By referring to the keyboard arrangement, it will be observed that the machine is equipped with twenty-one control totals and two group totals. The machine is also equipped with a consecutive slip-feed mechanism and a wide printing device to produce the form illustrated.

The control keys in the first two rows on the keyboard design, except the "Total Sales" key, are used for accumulating by quantities the sales of the different brands of cigars. The third row, except the "Number of Cigars" key, is used to compile in dollars and cents into four main departments. The group total in row 3 accumulates a total of all items recorded on the keys in rows 1 and 2, except the "Total Sales" key. Group total of row 1 accumulates the items recorded on the department keys in row 3.



SALESMAN W. C. Smith

		DATE		BRAND	DEPT.	ACCOUNT
	1	JUN-8	59148	Admiration	Z — (1) —	9.25
	2	JUN-8	59148	Muriel	Z — (2) —	7.25
	3	JUN-8	59148	Flor De Manuel	Z — (3) —	4.25
	4	JUN-8	59148	Henry the Fourth	Z — (4) —	6.25
	5	JUN-8	59148	La Fendrich	Z — (5) —	7.25
	6	JUN-8	59148	Assorted 10c	Z — (6) —	4.25
	7	JUN-8	59148	Hand Made	Z — (7) —	4.25
	8	JUN-8	59148	Charles Denby	Z (8) — —	4.25
	9	JUN-8	59148	Assorted 25 & 60	Z (9) — —	4.25
	10	JUN-8	59148	New Currency	Z (10) — —	4.25
	11	JUN-8	59148	Muriel Inf.	Z (11) — —	7.00
	12					
	13					
	14					
	15	JUN-8	59148	NUMBER OF CIGARS	Z — — NoC	62.50
	16					
	17	JUN-8	59148	Tobacco & Cig'ts.	Z — — T&C	162.50
	18	JUN-8	59148	Candy	Z — — Cdy	112.50
	19	JUN-8	59148	Pipes	Z — — PiP	100.00
	20	JUN-8	59148	Cigars	Z — — Cgr	225.00
	21					
	22	JUN-8	59148	TOTAL SALES	Z — TSa —	600.00
	23					
	24	JUN-8	59148	GROUP TOTAL CIGARS	Z — — 1GT	62.50
	25	JUN-8	59148	GROUP TOTAL SALES	Z 1GT — —	600.00
	26					
	27					
	28					
	29					
	30					

Figure 14. Keyboard Arrangement of Flat-Printing Platen Accounting Machine and Salesman's Record Sheet—Cigar and Tobacco Application

Wholesale Distributors' Sales Analysis Routine.—The machine is equipped with two "Proof" keys which read "Number of Cigars" and "Total Sales." One accumulates the total number of all cigars sold by the salesmen, while the other accumulates the total amount of sales of all departments. These two "proof" totals must check with the two group totals.

The method of analysis is very simple. Approximately seventy-five orders are received daily from forty-five salesmen selling cigars, tobacco, cigarettes, candy, and pipes to retailers. After the orders are properly filled and billed, they are passed to a clerk, who sorts them in alphabetical sequence according to salesmen's names. The total of the order is established by the billing operation, serving as a predetermined total for the tabulating machine. After all orders are properly sorted, they are dispatched to the tabulating machine operator for analysis.

The amount of each item on the order is recorded on the proper department total key. If the item covers a sale of cigars, a second registration is made. On the second registration the number of cigars sold is set up on the amount keys and recorded on the proper "Brand" total.

After all items on the order have been recorded, the total amount of the order is then recorded on the "Total Sales" key. The total number of cigars sold on the order is recorded on the "Number of Cigars" total. All orders of each salesman are analyzed in the same manner. When the analyses of the salesmen's orders have been completed, the operator reads the "Total Sales" and "Number of Cigars" totals as well as the two group totals. If the two proof totals check with the group totals and the predetermined total established by the billing operation, the analysis is correct.

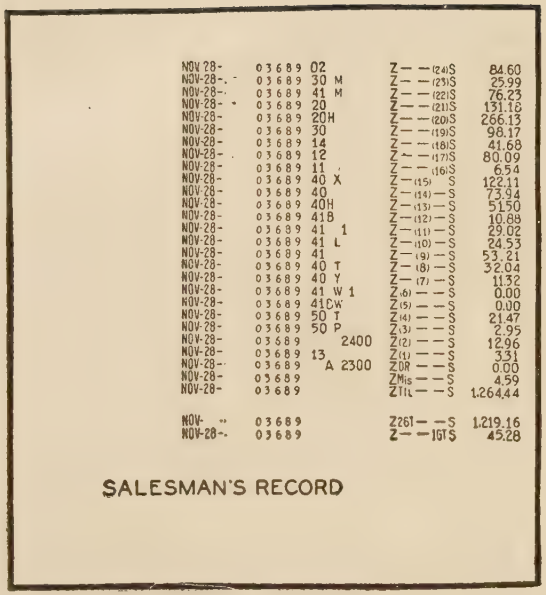
A separate binder is kept for each salesman, in which the take-off sheets (as illustrated in Figure 14) are filed. After the proof has been established, the operator records on the machine the totals shown on the last sheet in the salesmen's

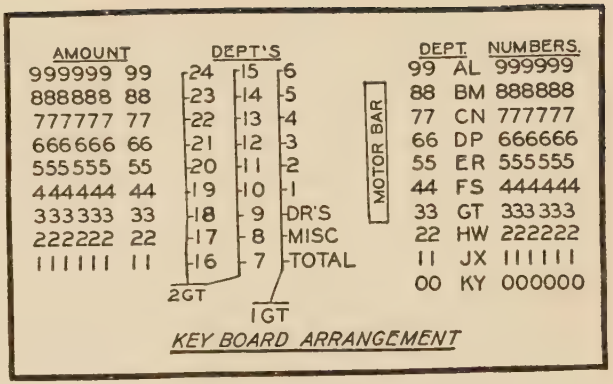
binder, then restores the machine to zero by clearing the machine on a new sheet, after which the sheet is placed in the binder.

By means of the consecutive slip-feed mechanism on the machine, the take-off is automatically spaced after the clearing of each total. The wide printer provides the desired space for the names of the brands and departments which are preprinted on the sheet. The last sheet then shows the total amount of sales made in each department for the month to date by the salesman, and the total of all sales to date. It also shows the number of cigars of each brand sold by the salesman, as well as the total number sold to date. It will be observed by referring to the form illustrated that the number of cigars sold and total sales check with the two group totals.

Where this system has been adopted, approximately 3,000 items a day are classified by the above analysis, which are easily handled by one clerk, whereas the former system required three clerks functioning under a pen-kept routine. This required the information to be spread on large columnar sheets in a slow as well as in an expensive and tedious method. It was afterward necessary to total these columnar sheets which often resulted in considerable expense and loss of time in balancing and proving.

Retail Sales Analysis Routine.—Another routine, illustrated in Figure 15, represents a thorough analysis of the following system. The requirements of this accounting condition called for an analysis of sales of each of forty departments by salesmen, the grand total sales of each salesman, the total sales made in each of forty departments by all salesmen, and the grand total sales made by all salesmen. This information was desired primarily as the basis for commissions paid to salesmen. However, data pertaining to departmental profits and stock turnover were to be obtained from the same information. Departments carried different rates of commission, which





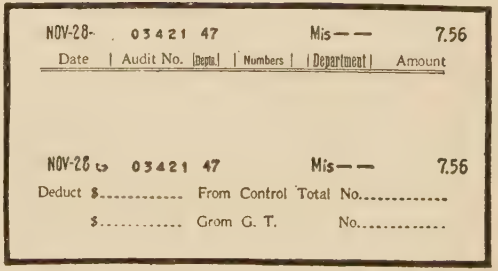

NOV-28- 03421 47 Mis — — 7.56
Date | Audit No. | Depts. | Numbers | Department | Amount
NOV-28 03421 47 Mis — — 7.56
Deduct $..... From Control Total No.....
$..... Grom G. T. No.....

Figure 15. Keyboard Arrangement of Flat-Printing Platen Accounting Machine, Salesman's Record and Tabulating Machine Ticket

were rated according to the departmental gross profit. The sales analyses caused salesmen to sell the entire line and extend their best efforts to increase the sales of the more profitable lines.

Before the plan illustrated was adopted, the analysis of sales was made daily from customers' filled orders. After the orders had been posted to the accounts receivable ledgers and totaled, they were dispatched to the sales analysis department. Each order was analyzed separately by totaling all items for each department represented on the order. The total for each department was written at the foot of the order. The department totals were then added and proved against the total of the order. This was done to localize errors and to condense the posting to salesmen's sheets. After all orders had been analyzed in this manner, they were sorted according to salesmen. The department totals and total of each salesman's orders were posted to the proper columns on the salesman's record sheet. There was a separate sheet for each salesman. The posting for each order was made on one line of the sheet. After all the orders for all salesmen had been posted to the salesmen's sheets, the columns on each sheet were added to obtain the department sales totals and grand total sales for each salesman. The department totals were cross-added to see that the distribution agreed with the grand total. When the individual salesman's sheet had been balanced, the totals were posted to a recapitulation sheet. The grand total daily sales on this sheet had to agree with the total secured by the bookkeepers when the orders were posted to the accounts receivable ledgers. Credits were analyzed once or twice a week in a similar manner. At the end of the month, the credits were deducted from the sales figures to obtain the net sales for each salesman and the grand total net sales. This system required the services of nine clerks before the introduction of two accounting machines equipped with flat-printing platens for the sales analyses. Twenty-seven control totals and

two group totals are provided for on each machine. Twenty-four of the control totals are used for the twenty-four major departments, one total for miscellaneous departments, another for providing orders, and a "debits" total. Rows 1 to 6 of the number-printer keys are used to print numbers for sub-accounts, etc. Rows 9 and 10 print department numbers. As each key on the machine represents a different classification on different runs, a symbol is set on the number-printer and printed on the audit sheet and inserted forms, when the total is cleared, to designate the particular department or classification which the total key represents on that run.

Analyzing Departmental Sales by Salesmen.—The method adopted for analyzing salesmen's orders on the machine is as follows. Orders are posted to the accounts receivable ledgers, and a total is taken of all orders as was done by former methods. The orders are then sent to the sales analysis department where they are sorted according to salesmen. Each salesman's orders are analyzed as a unit. An average of about twelve hundred orders are handled daily, each order averaging from ten to fifteen items. Each item on an order is recorded by setting up the amount of the item on the amount keys, pressing the proper department key, and operating the machine. The amount is added on the department total and on a group total as shown by the keyboard arrangement. On the audit sheet are printed the serial number of the registration, the symbol for the department total, and the amount. The item counter for the department total key advances one digit for each transaction introduced into the machine.

Each item that comes under the miscellaneous departments is recorded on the "Misc." total, the number of the miscellaneous department being set up on the number-printer. When recording a "Misc." item, a ticket is issued which shows the date, serial number of the registration, department number, symbol for the "Misc." total, and the amount. These tickets

are later sorted by miscellaneous department numbers and totaled to obtain the total sales in each of these departments.

When all items on the order have been entered, the total of the order is recorded on the "Order Proof" total. If the distribution has been made correctly, the "Order Proof" total should always agree with the sum of the group totals. These three totals are read after an average of five orders has been analyzed. This is done in order to localize any error that may have been made. If the totals do not agree, the operator checks the orders with the audit sheet and makes the necessary adjustments. However, very little checking is necessary under this routine.

When all orders for one salesman have been analyzed, the salesman's sheet is placed on the consecutive feed printing table, and the department totals are cleared. As each total is cleared the symbol for the classification represented by the total is set up on the number-printer keys and printed on the salesman's sheet and audit sheet. The sheet moves forward after each total is cleared. After all orders for all salesmen have been analyzed and the totals cleared on the salesmen's sheets, the department totals for each salesman are summarized on the machine to secure the departmental sales and grand total sales for all salesmen. These totals are cleared on a separate sheet. The grand total of sales must agree with the predetermined total secured by the bookkeeper when the accounts receivable ledgers were posted. Monthly totals are obtained by summarizing the daily sheets.

The item counters prove very valuable in that they keep a record of the number of sales made in each department, automatically securing an average unit per sale and other sales information. The serial number shows the grand total number of sales. Credits are analyzed in a similar manner four or five times a month. The monthly credit totals are deducted from the gross sales totals to obtain the net sales totals. The entire sales analysis routine described involved the handling of an

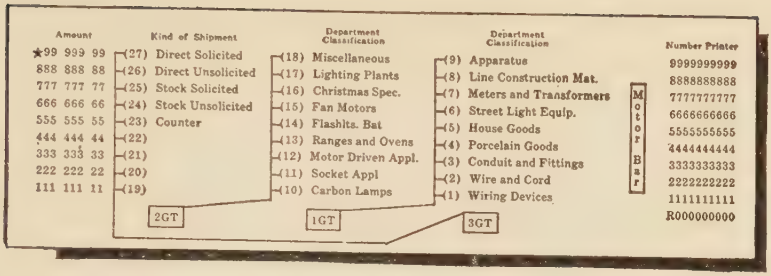
average of 1,200 orders daily, each order averaging from ten to fifteen items. From 6,000 to 9,000 items are run daily through each of the two machines.

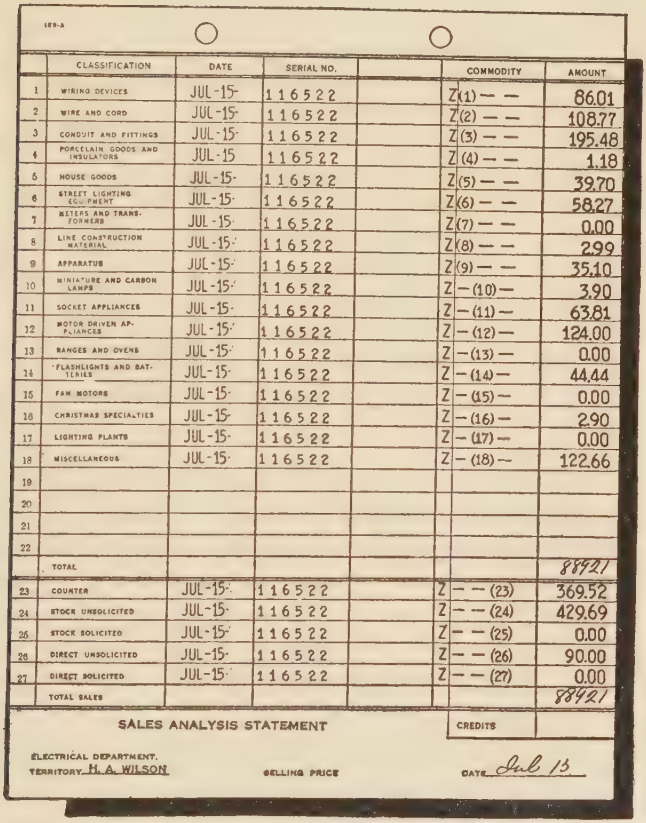
Jobbers' or Manufacturers' Sales Analysis Routine.—The routine illustrated in Figure 16 is suitable for jobbers or manufacturers of electrical, automobile, machine, or radio supplies, who conduct both a wholesale and retail business. Where the system illustrated has been adopted, the business is divided into four main departments, namely, electrical accessories, automobile accessories, machinery supplies, and radio, each department having a number of classifications of sales. The first three departments named have eighteen separate classifications of sales and costs. The radio department has only ten classifications of sales and cost.

Shipments of merchandise are classified under the following: counter, stock unsolicited, stock solicited, direct unsolicited, and direct solicited. Shipments made from warehouse constitute stock shipments, either solicited or unsolicited, depending upon the manner in which the order was placed. Shipments are also made direct from other manufacturers to customers, and these shipments are known as direct shipments, and are classified either as unsolicited or solicited.

The equipment used in this application is an accounting machine equipped with flat-printing platen, which is capable of establishing from one to twenty-seven control totals and three group totals, and has a number-printer. Control totals, 23, 24, 25, 26, and 27, provide classifications as to kind of shipment. These keys are used in connection with the classification keys 1 to 18.

Method of Analyzing Invoices for Selling Price.—The method of analyzing invoices for selling price is as follows. Copies of the invoices are dispatched to the machine operator for analysis. Each invoice shows the billing of the goods sold, the selling price, and the cost price. The code number of each





	CLASSIFICATION	DATE	SERIAL NO.		COMMODITY	AMOUNT
1	WIRING DEVICES	JUL-15-	116522		Z(1)— —	86.01
2	WIRE AND CORD	JUL-15-	116522		Z(2)— —	108.77
3	CONDUIT AND FITTINGS	JUL-15-	116522		Z(3)— —	195.48
4	PORCELAIN GOODS AND INSULATORS	JUL-15	116522		Z(4)— —	1.18
5	HOUSE GOODS	JUL-15-	116522		Z(5)— —	39.70
6	STREET LIGHTING EQUIPMENT	JUL-15-	116522		Z(6)— —	58.27
7	METERS AND TRANSFORMERS	JUL-15-	116522		Z(7)— —	0.00
8	LINE CONSTRUCTION MATERIAL	JUL-15-	116522		Z(8)— —	2.99
9	APPARATUS	JUL-15-	116522		Z(9)— —	35.10
10	MINIATURE AND CARBON LAMPS	JUL-15-	116522		Z—(10)—	3.90
11	SOCKET APPLIANCES	JUL-15-	116522		Z—(11)—	63.81
12	MOTOR DRIVEN APPLIANCES	JUL-15-	116522		Z—(12)—	124.00
13	RANGES AND OVENS	JUL-15-	116522		Z—(13)—	0.00
14	FLASHLIGHTS AND BATTERIES	JUL-15-	116522		Z—(14)—	44.44
15	FAN MOTORS	JUL-15-	116522		Z—(15)—	0.00
16	CHRISTMAS SPECIALTIES	JUL-15-	116522		Z—(16)—	2.90
17	LIGHTING PLANTS	JUL-15-	116522		Z—(17)—	0.00
18	MISCELLANEOUS	JUL-15-	116522		Z—(18)—	122.66
19						
20						
21						
22						
	TOTAL					884.21
23	COUNTER	JUL-15-	116522		Z— —(23)	369.52
24	STOCK UNSOLICITED	JUL-15-	116522		Z— —(24)	429.69
25	STOCK SOLICITED	JUL-15-	116522		Z— —(25)	0.00
26	DIRECT UNSOLICITED	JUL-15-	116522		Z— —(26)	90.00
27	DIRECT SOLICITED	JUL-15-	116522		Z— —(27)	0.00
	TOTAL SALES					884.21

SALES ANALYSIS STATEMENT — CREDITS

ELECTRICAL DEPARTMENT.
TERRITORY H. A. WILSON — SELLING PRICE — DATE Jul 15

Figure 16. Keyboard Arrangement of Flat-Printing Platen Accounting Machine with Sales Analysis Statement

article, the unit cost, and extension are also entered in separate columns on the left-hand side of the invoice. The invoices are first sorted by salesmen, then by department, and by kind of shipment. This makes it possible for the "kind of shipment" key in row 3 to remain fixed when running the invoices for a department, as there are quite a few items for each kind of shipment. If, for example, the first item on the direct solicited invoices for the electrical department calls for twelve 6-ampere plug fuses at a selling price of $0.85, marked Code No. 1, the operator sets up the selling price on the amount keys, depresses total key (27), which represents direct solicited shipments, total key (1), representing wiring devices, and operates the machine.

The amount is added on the totals for the keys depressed, and also on a group total as shown by the keyboard arrangement. The audit sheet within the glass enclosure on the machine is printed with a detailed record of the registration consisting of the serial number, symbols for the total keys used, and the amount. The item counters for the keys depressed advance one digit for each transaction introduced into the machine.

Preparation of Report.—The manner in which machine totals are cleared onto the report form illustrated is as follows. After the invoices of a salesman covering one department have been analyzed for selling price, the report form is inserted on the printing table, and the various kinds of shipment and department classification totals are cleared. The machine thus provides a printed report of the sales in that department by classification and by kind of shipment. The remaining invoices for each salesman are then run through the machine, each department being taken separately.

The reverse side of the report form illustrated is used to print the cost price totals and is printed and lined with green ink. After all the invoices for one salesman have been analyzed for selling price, they are run through the machine to record

the cost price, the cost price having been previously figured and noted in pencil on each invoice. When all the invoices for one department for a salesman have been analyzed for cost, the reverse side of the report form is inserted on the printing table and all the classification and kind of shipment totals are cleared. This operation furnishes a complete report by classification of the salesman's work in this department. When figuring the profit on classifications, the form need only be folded over part way for comparison of the cost with the sales. After all the invoices for all salesmen have been analyzed in a similar manner for sales and costs, the printed reports are filed in a binder. At the end of the month it is only necessary to add these reports together on the machine in order to get a complete report for the entire month.

Motion Picture Rental and Contract Analysis by Exchanges.—The "ticket method" will prove of advantage to producers and distributors of motion pictures who are presented with the problem of analyzing rentals and contracts by exchanges, producer and production, in dollars and cents, and the analysis of accessories by exchange and production in quantities. The routine described in the following and illustrated in Figure 17 exemplifies what may be attained.

Analysis by Producers.—References are made to the keyboard arrangement, the first five accessories totals in row 1 of the total keys denote classifications, and are used on the accessory analysis only. The A, B, C, and D totals in row 1 are provided for expansion. The producers' totals in rows 2 and 3 of the total keys are used on the rental and contract analyses only. There are seventeen producers and one miscellaneous in each exchange, making a total of eighteen producers. The "shorts" key in row 2 is used as the miscellaneous total.

Analysis by Exchanges.—The page group total is cleared after the analysis of each sales sheet, and is checked against

the hand-written total on that sheet. The exchange group totals are cleared after each exchange is run. The exchange group total at the bottom of row 2 is used in the accessory analysis to accumulate a total of sales in each exchange. Rows 1 and 2 of the number-printer keys, reading from right to left, denote exchange numbers; rows 3, 4, and 5 print symbols for the kind

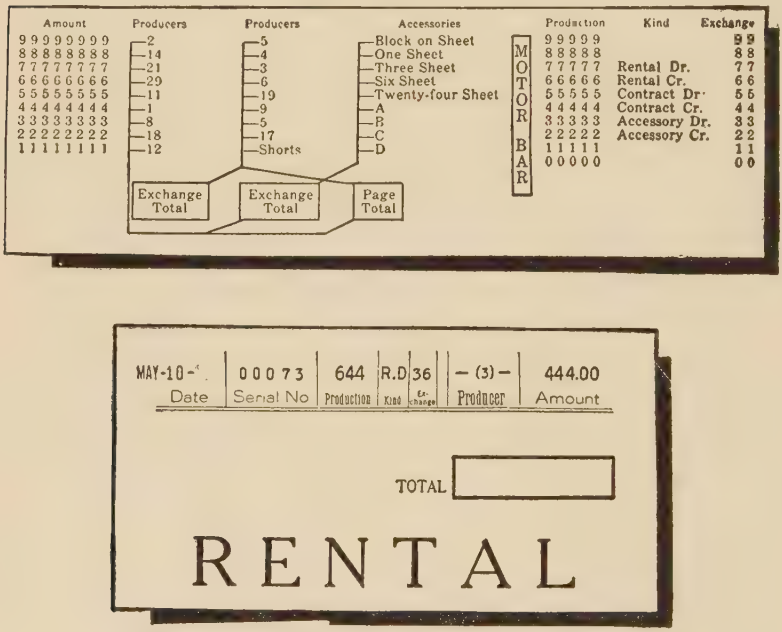


Figure 17. Keyboard of Flat-Printing Platen Accounting Machine and Rental Ticket

of debit or credit. Rows 6, 7, 8, 9, and 10 are used to print production numbers. The debit and credit and exchange number keys are of fixed construction. White tickets are issued by the machine when running debits. Pink tickets are issued when running credits. The procedure in running credits is the same as that on debits. They are, however, run separately.

Sales sheets showing rentals are received weekly from each exchange. There are thirty-eight exchanges operated by the

firm where the system illustrated is in use, and the average number of items on all sales sheets for all exchanges amounts to approximately 30,000 a week. The sales in each exchange are analyzed separately. This analysis is made in dollars and cents. Each item on a sales sheet is recorded as follows. The operator sets up the production number, "Rental Dr.," and the exchange number on the number-printer keys, presses the proper producer's total key, and operates the machine. The "Rental Dr." key is held down until this analysis is completed. The exchange key is held down until the next exchange is analyzed.

The transactions are added on the producer's total and on an exchange group total as shown by the key arrangement. A white ticket is issued as each item is recorded, inasmuch as the debits are being run. This ticket, as will be seen by the illustration, shows the date, consecutive number of the registration, production number, "Rental Dr.," exchange number, the symbol for the producer, and the amount. The audit sheet is printed with the same information with the exception of the date.

After all items on a sheet have been recorded, the page group total is cleared. This total must check with the total indicated on the sales sheet. After all sales sheets for an exchange have been analyzed, the operator clears all the producers' totals and two exchange group totals. This is done in order to obtain the total amount of rentals by producers and a grand total of all rentals in the exchange.

Analysis by Productions.—The next step is to determine totals by productions. The number of productions varies, but there can be from one to about 800 productions for each exchange. The tickets, issued as each item on the above analysis was recorded, are sorted by production numbers, clamped together, and totaled for each production on a non-listing machine. The total amount for each production is marked on the top ticket in each lot. A square is provided on the tickets for this

purpose. In many cases there are only two or three tickets for a production and the maximum is below 35.

The top tickets referred to are run through the machine on a second run recording the total for each production on the proper producer's total. The audit sheet will show the totals by productions in the exchange in the exact order in which they were recorded. A ticket is issued on each registration of this run.

After all the top tickets have been run, the producers' totals and exchange group totals are cleared. The audit sheet for this run is used as the final report on rental debits for this exchange. The totals just cleared are checked against the producers' totals and grand total obtained previously when clearing the machine after the sales sheets for the exchange have been analyzed. If the grand totals do not check, it is evident that a ticket has been lost or that a mistake has been made in totaling. By comparing the two sets of producers' totals, it is easy to locate the producer whose totals do not check. By checking the tickets of this producer against the audit sheet, it is a simple matter to find the information that was on the missing ticket, or to locate any error. This is due to the fact that each ticket bears a consecutive number which corresponds with a consecutive number on the audit sheet. If the ticket is missing, another is made out to take its place. This check also proves that amounts were added correctly on the non-listing machine. All rental debits for the remaining exchanges are analyzed in a similar manner.

The tickets issued on the second run are held by exchanges until the last exchange has been run. This is done to eliminate the possibility of losing tickets. The tickets for all exchanges issued on the second run are then sorted numerically by productions. They are clamped together and added on non-listing machines. The total of each production is marked on the top ticket in each lot. The top tickets are then run through the

machine, numerically by productions, recording the total for each production on the proper producer's total.

After all the top tickets have been run, the producers' totals and exchange group totals are cleared. The audit sheet on this run is used as the final report on rental debits for all exchanges. The totals just cleared are then checked against a recapitulation of producers' totals and grand totals which were obtained by clearing the machine after the sales sheets for each exchange were analyzed. Rental credits are analyzed in a similar manner. However, pink tickets are issued when running credits. The contract analysis for both debits and credits is made from contracts in a manner similar to the rental analysis.

Analysis of Accessories.—The accessory analysis is as follows. Sales sheets showing accessory sales are received weekly from the exchanges. These sheets are analyzed by exchange, production, and five classifications. This analysis, as previously stated, is made in quantities. Each exchange is analyzed separately as before. Each item is recorded in the following manner. The operator sets up the production number, "Accessory Dr.," and the exchange number on the number-printer keys; the quantity on the amount keys; presses the proper classification key in row 1 of the total keys; and operates the machine. The transactions are added on the classification and on the exchange group total at the bottom of row 2 A white ticket is issued on each registration showing the date, consecutive number, production number, "Accessory Dr.," exchange number, classification symbol, and the quantity. The audit sheet is printed with the same information, with the exception of the date. After all sales sheets for the exchange have been analyzed, the classification totals and the exchange group total at the bottom of row 2 are cleared.

How Analyses Are Checked and Proved.—The tickets are then sorted by productions and totals to obtain the quantity of each classification by producers. This totaling is done on

non-listing adding machines. The total of each classification for each production is marked on the top ticket in each lot. The top tickets are then run through the machine, numerically by productions, recording the amounts of the classification totals for each of the five classifications for all productions in the exchange. After all the top tickets have been run, the five classification totals and the exchange group total at the bottom of row 2 are cleared. The audit sheet for this run is used as the final report on accessory debits for this exchange. The totals just cleared are then checked against the classification totals and grand total obtained on the first run when analyzing the sales sheets for that exchange. The method of checking is identical with the method used in checking rental analysis previously explained. All accessory debits for the remaining exchanges are analyzed in a similar manner. Accessory credits are handled in the same way. Pink tickets, however, are issued instead of white. Where this system has been adopted, 12,000 items are run through three machines a day, 1,700 an hour, or 600 an hour, average for each machine with the following results:

1. The rental and contract analysis provides for both debits and credits the total amount of rentals and contracts, and the total of:
   (a) Each producer in each exchange.
   (b) All producers in all exchanges.
   (c) Each production in each exchange.
   (d) All productions in all exchanges.
2. The accessory analysis provides for both debits and credits the total quantity of accessories sold of:
   (a) Each classification in each exchange.
   (b) Each production in each exchange by classification.

Many splendid applications for average sales analysis conditions have been developed for use on descriptive writing equip-

ment. However, since the volume of detail involved in accounting conditions for sales analysis is often very great, the authors have chosen the systems above illustrated to show that the production of usable information from mass detail can be attained through the application of mechanical accounting equipment.

CHAPTER X

SALES COMMISSION ACCOUNTING

Sales Commission Accounting Defined.—Since sales commission accounting is that special branch of accounting work which requires the computation, recording, and payment of salesmen's commissions, it is entirely possible, as in other branches of accounting, to make mechanical accounting equipment the means of accomplishing quantity production through control of accuracy, logical routine, and the machining of various records in one writing.

How Control of Accuracy in Accounting Is Secured.—Control of accuracy in accounting is secured by having the result of one operation check against the result of another operation. In order to secure that positive check, it is necessary that the routine by which the work is handled be such that the result of one operation shall be ready to meet the result of another operation. The checking points of the two series of operations must be completed at approximately the same time and in logical sequence. That is what is meant by "logical routine"—routine which sets up a control figure as illustrated in the chart in Figure 18, and at the same time has in process the posting of detail figures, so that the result of the detail work promptly meets the established control figure. In many cases the result of one detail run of postings meets not only the established control figure, but also the result of another run of detail postings, provided it is so arranged that the work is done at the right time and in the right sequence. Not only do mechanical methods set up a positive means by which control of accuracy and logical routine are easily obtained, but they

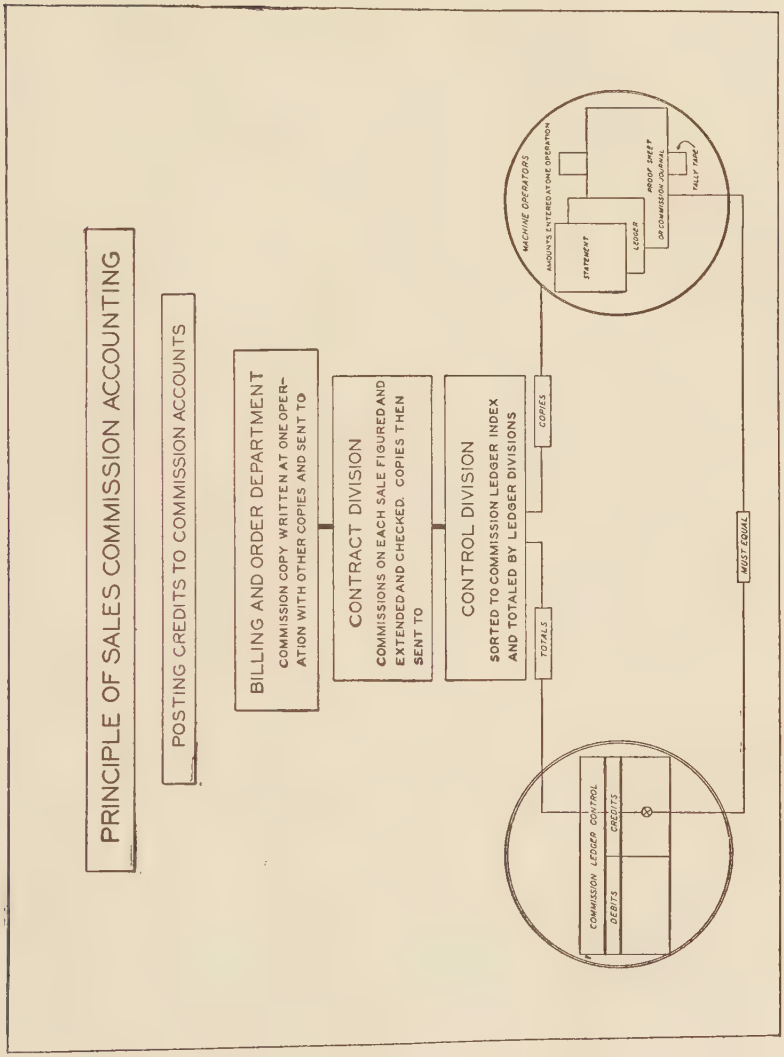


Figure 18. Routine Chart Illustrating Principle of Sales Commission Accounting

also make possible the combination of related records in a manner which permits the writing of a number of such records at one operation. It is apparent, therefore, that quantity production in accounting can be accomplished only when the three factors, (1) control of accuracy, (2) logical routine, and (3) combination of records, are obtained.

Purpose of the Computation of Commission.—In view of the fact that the main purpose of the computation of commission is to arrive at the sums due salesmen for services rendered, the figures must be ready on given dates pursuant to arrangements made with the salesmen. There is, therefore, the same necessity for having the figures ready on a specific date as that existing in the payroll accounting requirements discussed in Chapter XIV.

Type of Sales Commission Ledgers.—Commission ledgers are kept because of necessity and desirability, and since salesmen are paid for their sales of merchandise delivered, accepted, and paid for, an account is opened therein for each salesman. Salesmen on a commission basis are paid for actual accomplishment, and until the goods are paid for, it is customary to consider the sale as not consummated. Commissions may be advanced upon receipt of the order, but unless the goods are paid for, the commission is charged back to the salesmen. There are, therefore, two kinds of sales: (1) straight or unconditional sales, and (2) conditional sales.

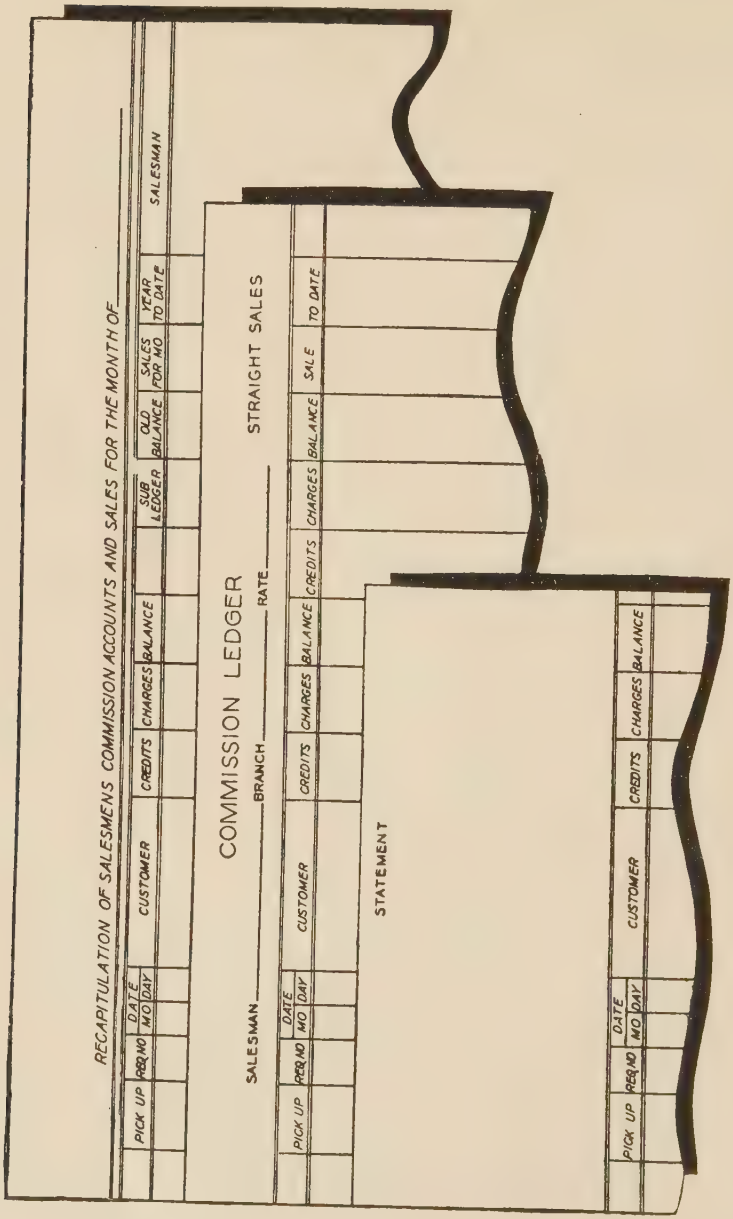
Forms illustrated in Figure 19 show how a straight commission ledger routine operates. The commission statement, ledger, and proof sheet of commissions on straight sales are machined at one operation when credit posting is being made. When a cash debit posting is being made these forms are also machined simultaneously. The recapitulation of commissions serves several purposes as follows:

1. It is a name and amount trial balance sheet.
2. A listing of totals of commissions credited each salesman during the month.
3. A listing of cash paid to each salesman.
4. A listing of balances due the company by salesmen.
5. A listing of balances due salesmen.
6. A listing of salesmen's total straight sales to date.
7. It shows the grand total of all salesmen's commissions earned, all commissions paid, balance commissions due, and total sales made during the month by entire sales force.

It is impossible to conceive of a more complete report than that supplied by this recapitulation of salesmen's commissions.

The Information a Sales Commission Ledger Should Furnish.—In order to simplify the work, it is customary to segregate conditional sales from straight or unconditional sales, and to post straight sales to a separate ledger sheet or a separate column from conditional sales. Different kinds of merchandise pay different commission rates. Classification of merchandise sales according to commission rate is sometimes required. From the foregoing, it will be realized that the information which a sales commission ledger may be required to furnish includes the following:

1. Memorandum of each sale, date, and customer's name.
2. Amount of each sale.
3. Classification of merchandise.
4. Amount of commission on each sale.
5. Total straight sales and total conditional sales.
6. Date customer paid for each bill of goods.
7. Total gross commission earned to date this year on straight sales and on conditional sales.
8. Total commission due and payable.
9. Amount of each payment of commission with date.


RECAPITULATION OF SALESMENS COMMISSION ACCOUNTS AND SALES FOR THE MONTH OF
PICK UP
REQ NO
DATE MO DAY
CUSTOMER
CREDITS
CHARGES
BALANCE
SUB LEDGER
OLD BALANCE
SALES FOR MO
YEAR TO DATE
SALESMAN
COMMISSION LEDGER
SALESMAN
BRANCH
RATE
STRAIGHT SALES
STATEMENT

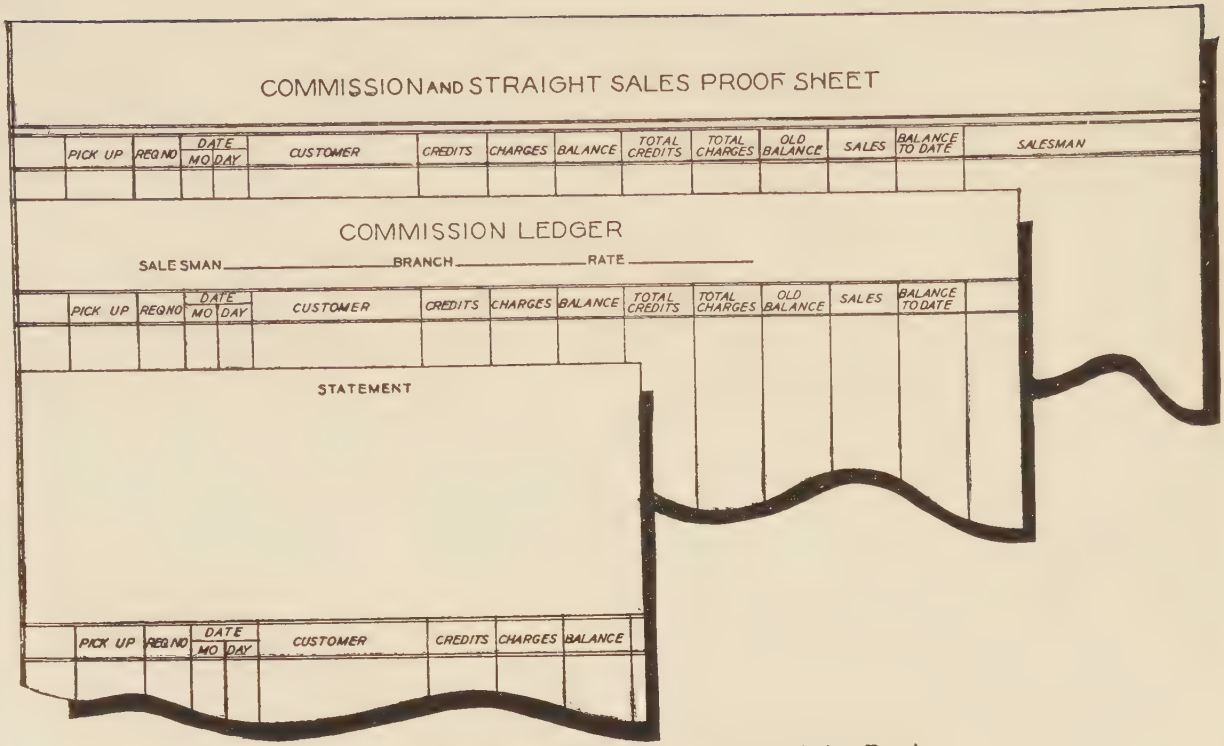


Figure 19. Forms Used in Straight Sales Commission Routine

Forms Required in Sales Commission Accounting Routines.—The sales commission accounting forms common to practically all conditions enumerated above are:

1. Commission.
2. Straight sales ledger sheet.
3. Journal of straight sales.
4. Conditional sales ledger sheet.
5. Journal of conditional sales.
6. Commission check.
7. Check register.

It is apparent that sales commission ledger sheets will vary in design according to the requirements of the particular condition and the information which is most needed. Comparatively few ledger sheets are so designed as to give all the information specified above. The fundamental requirements common to all sales commission ledger sheets that are posted on mechanical accounting equipment are: Old Balance, Debit, Credit, and Balance columns, and often columns to show the total commissions earned to date for the year. There can be no hard and fast rule for the design of sales commission ledger forms. As has been stated, their design is governed by requirements of the accounting condition being dealt with, and the information which will be of vital value.

Source of Entries to Sales Commission Ledgers.—The posting medium for both straight sales and conditional sales commission ledgers may be:

1. A copy of the invoice to the customers, or
2. A copy of the shipping order, or
3. The proof sheet of postings made daily of each salesman's sales to the accounts receivable ledgers.

It is possible to use proof sheet totals of the postings to the accounts receivable ledgers only when such ledgers are arranged according to salesmen's territories. It is apparent that when

the ledgers are so arranged and each salesman's sales are looked upon as an accounts receivable run of postings, the machine accumulates the total of the salesman's sales each day. It becomes a simple matter then, to use a copy of the proof sheet as the proper medium upon which to figure the salesmen's commissions. When this is done, it is customary to make a one-line

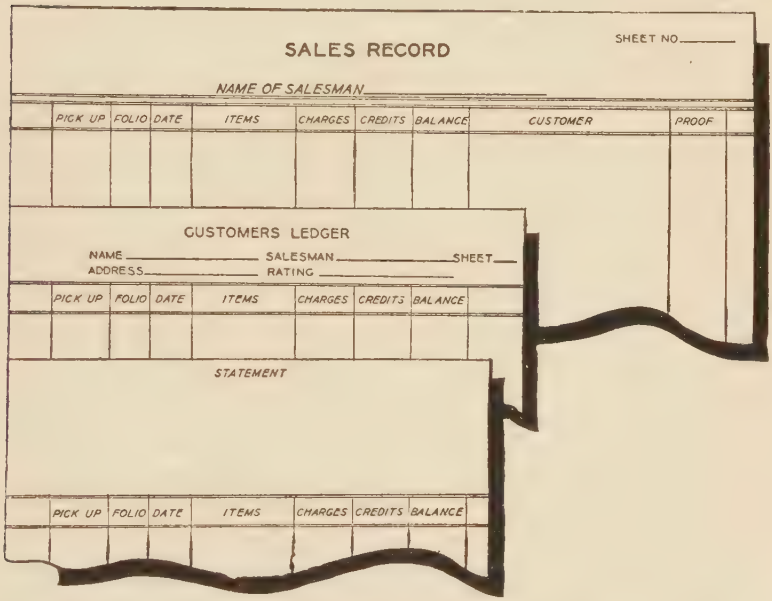


Figure 20. Accounts Receivable Set-up of Statement, Ledger and Salesman's Record

entry daily to the salesman's commission ledger account of the total commission earned that day, not specifying each sale in detail on the commission ledger, but rather having the proof sheet of the accounts receivable posting contain the only record of the details of that salesman's sales.

Forms used in an accounts receivable routine are illustrated in Figure 20. These forms show set-up of statement, ledger, and debit proof sheet. The customers' accounts are segregated

according to salesmen's territories. The debit proof sheets of postings serve as journals or listings of salesmen's sales, giving all the information necessary for figuring commissions on each salesman's sales at one operation daily. Instead of figuring the commission on each separate sale, the total as shown at the bottom of the charge column on the proof sheet is multiplied by the rate of commission and a one-line credit entry made daily to the salesman's commission account in the commission ledger.

Posting Media of Commissions Payable.—The first requirement for the above routine is to figure the commission payable, indicating the result on the posting media. The posting media are then sorted in alphabetical sequence according to salesmen's names under the headings of conditional sales and unconditional sales. Adding machine totals are taken of each classification, and the adding machine tapes are taken to a control clerk, who later audits the proof sheet journals for the purpose of determining whether the machine totals check against these predetermined adding machine totals. A separate run of postings is made of straight and conditional sales.

Preparation of Commission Journal, Statement, and Posting to Ledger Simultaneously.—In accordance with modern standards of accounting efficiency, the machine operator easily obtains quantity production when posting to a straight sales commission ledger by having the following forms in the machine properly aligned and interleaved with carbon paper and by writing all of them in one operation:

1. The commission statement.
2. The ledger.
3. The journal (or proof sheet).

Under this plan the statements are ready at any moment for payment, requiring only a one-line entry which records the amount of the commission check. This is part of the elimina-

tion of peak load clerical labor which always must exist under pen methods. The automatic balancing accomplished by the machine completes the elimination of the peak load. At the close of the day's work, the total commission credited to all salesmen on their individual ledger sheets is posted to the controlling commission account in the general ledger, thereby maintaining accounting control.

Conditional Sales Ledger a Memorandum Record.—The commission ledger of conditional sales should be considered as

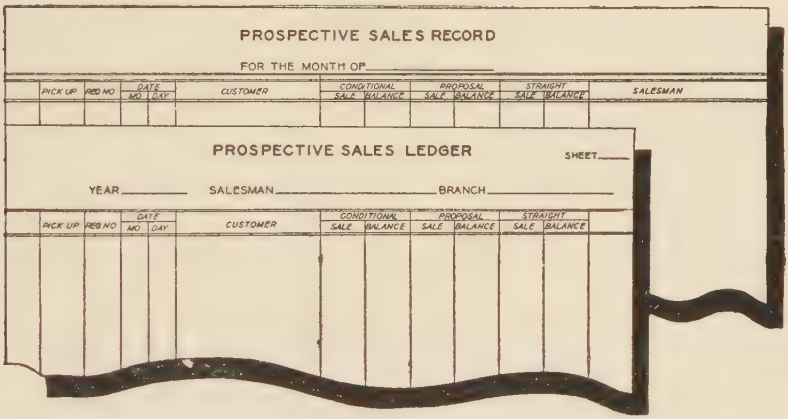


Figure 21. Forms Used in a Prospective Sales Commission Routine

merely a memorandum ledger, and the amounts posted thereto are not to be recognized as actual but rather as contingent liabilities. Therefore, the amounts posted to this conditional commission ledger are not debited to the commission account in the general ledger, but to a memorandum account which is finally reflected on the balance sheet of the company as a contingent liability. As soon as these conditional sales are paid or become unconditional by a written acceptance by the customer, they are billed to the customer and handled thereafter as unconditional sale.

Forms illustrated in Figure 21 are those used in a prospec-

tive sales commission routine. No statement is rendered for commissions on prospective or conditional sales. When a customer pays for merchandise which has been credited to the salesman as a prospective sale or when the customer signs a straight-sale contract or order blank, a transfer memorandum is made and the credit transferred from the prospective sales commission ledger to straight sales commission ledger.

Method of Recording Payments of Commission.—As it is customary to pay commissions monthly or semi-monthly,

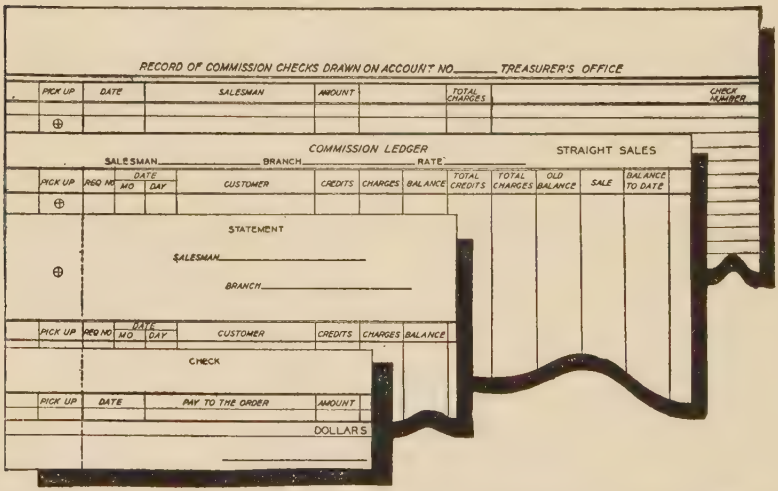


Figure 22. Commission Check, Salesman's Statement, Commission Ledger and Record of Commission Checks Drawn

the commission statement is at all times prepared under mechanical methods of sales commission accounting. When commissions are to be paid, the remaining routine is the writing of the check and check register, and the posting of an entry debiting the salesman with the amount of the remittance. The illustration shown in Figure 22 typifies the ability of mechanical accounting equipment to give quantity production. This illustration shows four forms of a sales commission ledger system

which are machined at the time a cash debit is being made to the commission account of a salesman. The forms consist of check, monthly statement, straight-sales ledger, and debit proof sheet. The latter is a record of commission checks drawn. The check entry carbonizes through to the three records indicated. Quantity production is accomplished by inserting in the machine the following records, and writing all the entries applicable to each at one machine operation:

1. The check.
2. The salesman's ledger sheet.
3. The commission ledger sheet.
4. The check register.

In other words, the check is written on the machine, the amount is charged to the salesman on his commission statement and ledger sheet, and a record of the check is simultaneously written on the check register (or journal of debit postings to salesman's commission accounts) at one operation.

Machine versus Pen-Kept Methods.—Since it is important that salesmen's commissions be paid promptly on a given date, and that postings be kept up to date, it is obvious why no peak load work of any nature should exist when this requirement is to be fulfilled. Under pen methods much time is lost in the footing of columns, balancing and preparing statements of commission accounts, which work often retards the completion of other accounting routine functions. Under mechanical methods, this peak load is eliminated, because the machine automatically has computed the balances due the salesman during the month, and has prepared the statements during the process of posting to salesmen's accounts. At the end of the pay period there remains nothing to do but to write the checks, which, under machine methods, is performed in such a manner as to place the closing entry on the monthly statement and the debit on the salesman's ledger sheet at the same

operation, and with the same effort with which the check and check register are written.

A sales commission accounting system may be regarded at its best only when it enables those engaged in the routine to complete each day's work each day, and to balance such work promptly at the close of each month, producing all necessary records so that they will be immediately available when required, doing all this with the least possible expenditure of effort. Machine methods of sales commission accounting enable the operators to accomplish these things for the reason that under such methods quantity production is accomplished through control of accuracy, logical routine, and the combination of several essential records. Since quantity production is one of the important fundamental features which machine methods produce, it is quite as much a factor in sales commission accounting as in any other branch of accounting.

CHAPTER XI

ACCOUNTS PAYABLE

The Application of Equipment to Accounts Payable Routines.—Those familiar with any type of machine, regardless of whether it be an accounting machine or not, know the advantage of loading thereon all the work for which the machine has capacity. It has always been found desirable with machine operation to reduce the human element to the smallest proportion where the precision of the work is a factor. The practice of arranging the preliminary steps of the various tasks which are to be completed on machines has come into general use for the purpose of effecting production efficiency. In view of this fact, it may be stated that in a truly efficient system of accounting production under machine methods, each day's work should be completed that day, and any system of accounts that permits an accumulation of back work into a peak load, does not fill the requirements.

There is always one best way of accomplishing a desired result, as we have observed in the preceding chapters. This is also true in the application of mechanical methods of accounting of vendors' accounts and distribution systems, although several methods may be used by preference from a scientific accounting and production standpoint.

System Survey and Analysis.—In most instances where organized effort is being made to apply the principles of scientific operative accounting methods and management in connection therewith, the work is usually performed in a very different manner than that herein described. It must be remembered that such investigations should consist of special departmental

routine studies for possible economies or increased efficiency. In making surveys for constructive accounting purposes the procedures outlined below may be used to advantage. The survey will plainly disclose whether a study is necessary. A detailed technical study of an accounts payable routine problem or department entails intensive work and covers all phases of scientific management. A report on existing conditions with general considerations should be prepared upon completion of the study, and recommendations therein should be followed by the fullest cooperation of the executive personnel in making them effective.

Survey Program for an Accounts Payable and Distribution Routine

When surveys are conducted for the purpose of analyzing accounts payable and distribution routines for machine installation, the following general queries should prove helpful to the individual making such a survey.

1. Are purchases made on verbal or written requisition? Obtain full particulars.
2. If orders are placed verbally in some instances, are they promptly confirmed in writing?
3. How are incoming goods accounted for?
4. How are partial shipments checked up and reported?
5. If goods are returned, how is accounting handled?
6. How are overs, shorts, and damaged goods reported to purchasing and accounts payable divisions?
7. How are purchase orders written?
   (a) By hand?
   (b) If by machine, ascertain make and type of equipment in use.
8. How many purchase orders are written per average month?
   (a) Ascertain average number of items per order.
9. Ascertain number of clerks employed on this class of work, whether male or female, hours per day devoted by each, and total salaries paid.

10. At what point in the handling of an incoming invoice is liability recognized?
    (a) Upon receipt of goods?
    (b) Upon receipt of invoice?
11. Do invoices have two or more items bearing different discount dates and payable to the same vendor, on the books at one time?
12. Is an invoice checking department maintained?
    (a) If not, does purchasing department take care of this work?
    (b) Are invoices in purchasing department controlled on an "unaudited invoice" controlling account?
13. Are invoices paid for goods that have not arrived, and are such invoices controlled through a "goods in transit" controlling account?
    (a) If not, how are such goods controlled?
14. Are invoices received from vendors chargeable to two or more accounts?
15. Ascertain the number of vendors from whom purchases are made regularly.
16. Is a voucher system maintained?
    (a) If not, are vendors' ledgers kept?
    (b) How are such records kept?
        (1) Card?
        (2) Loose leaf?
        (3) Bound book?
17. If a voucher system is maintained, could a saving be effected through changing to ledger system?
    (a) How many incoming invoices are received per average month?
        (1) How many are discounted?
        (2) How many are paid net?
18. Is an invoice register maintained?
19. Are invoices entered in register before they are checked?
    (a) If not, when?
20. Are all invoices numbered consecutively?
    (a) Upon receipt?
    (b) Upon entry?

21. Ascertain full particulars of routing of invoices from receipt until filed.
22. Ascertain whether all discounts are taken when available.
    (a) If not, why?
    (b) Are discounts missed?
23. Are certain days set aside for the payment of vendors' invoices?
24. Are net invoices ever paid before receipt of goods?
    (a) If so, what is routine?
25. How many banks are checks drawn against?
    (a) If more than one, and check voucher (voucher with check attached) system is either in vogue or desired, can bank be determined at time voucher is written?
    (b) If not, will it be satisfactory to stamp name of bank in check section just prior to writing check?
26. When is it decided upon what bank to draw checks in payment of invoices?
27. What is present form of:
    (a) Check?
    (b) Voucher?
    (c) Remittance letter or advice?
    (d) If remittance advice is used, ascertain whether it shows all ledger accounts written, or only items covered by check.
28. In what department are these records prepared?
29. How many are prepared in an average month?
    (a) Check.
    (b) Voucher.
    (c) Remittance letter or advice.
30. Ascertain the number of persons, male and female, who are engaged in the following operations.
    (a) Registering invoices.
    (b) Posting ledgers.
    (c) Writing vouchers.
    (d) Preparing remittance letters.
    (e) Other work.
31. Ascertain the total salaries paid for and the number of hours devoted to the above operations per day.

32. How many expense accounts are kept?
    (a) Ascertain number of units or divisions.
    (b) Is a balance extended on each account after posting?
    (c) If not, determine whether this feature would be desirable.
33. How many controlling accounts are kept?
34. Is expense distribution maintained by a unit expense ledger system?
35. What department is charged with the responsibility of the distribution of invoices?
36. Who indicates expense account to be debited on invoices received?
    (a) When?
37. What percentage of invoices contain items to be charged to different expense accounts?
38. Is distribution made direct from invoice?
    (a) If not, what is the basis of distribution?
39. How much detail is required to be written into distribution records?
40. What proof is established for posting to right account?
    (a) Also correctness of amount posted.
41. How many items (not invoices) are distributed in an average month?
    (a) From invoices received.
    (b) From payroll.
    (c) From stores records.
    (d) From other sources.
42. Are any other classes of accounting transactions distributed in the same records and by the same department?
    (a) If so, ascertain particulars as follows:
        (1) Source of medium: *a.* number of media; *b.* average number of classes affected per medium; *c.* average number of accounts affected per medium.
43. At what date each month are the last entries received for distribution?
44. At what date each month is all end-of-month work completely balanced?
    (a) Ascertain date of last trial balance.

(b) Has trial balance trouble ever been experienced?
(1) How often?
(2) What is the nature of the trouble?

45. What reports are prepared?
(a) How many copies are required of each?

46. Ascertain number of people employed in distribution routine, whether male or female, hours devoted each day, and total salaries paid.

47. Obtain copies of forms and records used with complete entries.

48. Note any additional information that may prove helpful.

How Production Efficiency Can Be Effected through Machine Methods.—The volume of detail and expense incident to maintaining an accurate record of incoming merchandise, noting the terms of payment so that discount earnings may be taken advantage of, and the issuing of checks, has always and doubtless will require considerable attention in the accounting divisions of progressive companies. In the treatment of this problem actual economy as well as a sense of security may be procured through the adoption of mechanical accounting methods presented in this chapter.

System Governed by the Requirements of Business and Its Vendors.—While there are manifestly many varied requirements entering into the various methods of handling vendors' accounts, these variations are governed both by the requirements of the business within which the system is to be used, and the type of vendor with whom the business deals. It is not the province of this book to insist that one system should be adopted in preference to the other, although it is the privilege of the authors to recommend such systems that will give the best results where there exist the specific conditions dealt with in this chapter.

Acceptance of Liability.—As will be seen by referring to the routine charts illustrated in this chapter, there are two

specific systems applicable to the handling of vendors' accounts and distribution. The first is the routine based upon the principle of acknowledging or setting up liability for goods as soon as invoices are received; and the second is the routine usually adopted when it is desirable to defer setting up the liability until receipt of goods.

Aside from the vital information as to the number of accounts handled, the number of people employed, and whether or not the management has been securing the results desired, there are certain determining factors which should be known and understood. These factors, in order, are stated below.

Question 1. At what point in the handling of an incoming invoice is liability recognized?

The answer to this question will determine at what point in the routine incoming invoices shall be totaled on one group, and this total entered to the credit of the "accounts payable" controlling account in the general ledger. This point may be the instant incoming invoices are matched in quantity and price with purchase orders; it may not be until the goods are actually received; or, because of special conditions of payment, the point of liability may vary between these two extremes.

Question 2. Do invoices that are payable to the same vendor bear different discount dates for two or more items thereon?

The answer to this question determines which is the more logical routine to use, i.e., creditors' ledger or voucher system in handling accounts with vendors, and has a vital bearing on the question of sorting and routing invoices in the accounts payable division of the accounting department.

Where two or more items bearing different discount dates appear on an invoice and are payable to the same vendor, a voucher system will permit the daily posting of all records at one operation, and will show the cumulative total payable to each vendor on each discount date. In every case, however, except where invoices have two or more items bearing different

discount dates and payable to one vendor at one time, the ledger system may prove highly desirable.

Purpose of Accounts Payable Records.—It must be clear at the outset that accounts payable records are kept for two purposes: (1) the reconciliation of the purchaser's account with vendor's statement, and (2) to record payments to the vendor in such a manner that their audit may be made later without difficulty.

It will be noted from the charts illustrated in this chapter that certain records are required, upon which all entries and all balances must be identical. Routines functioning under the creditors' ledger method require the following records:

1. A loose-leaf ledger with a page providing a continuous record of the transactions with each vendor.
2. A duplicate remittance advice and voucher (the voucher being a duplicate of the remittance advice). Original to go to vendor with check of payment. Duplicate to be numbered consecutively as paid and filed in this order with paid invoices attached for audit against check or disbursement register.
3. A proof or register sheet which is generally called a "purchase journal" or "purchase register," to provide a daily journal of purchases and information as to what accounts these purchases are for. Also for proof of work.
4. A proof or register sheet to record disbursements, generally called a "check register" or "disbursement register," to provide chronological information as to disposal of moneys withdrawn from banks.

Under the voucher system, the essential records are as follows:

1. A triplicate voucher:
   (a) Original to go as remittance advice to vendor with check of payment.
   (b) First copy (the voucher proper) to be filed numerically with paid invoices attached—for audit against checks drawn.

(c) Second copy to be filed A to Z by vendors' names for commercial reference and reconciliation purposes. (These copies provide a continuous record of the transactions with any one vendor.)

2. A proof or register sheet which is generally called a "purchase register" or "purchase journal," is a record of all invoices, debit memos, and credit memos that have been entered on the vouchers before payments are made.

3. A check or disbursement register is a record that takes the place of the voucher register which is used in pen methods of handling a voucher system.

The information that a creditors' ledger and duplicate remittance advice should contain is as follows:

1. Vendor's name and address.
2. Payment or discount date.
3. The posting media identification (invoice, debit memo, credit memo, and check numbers).
4. The date of each entry.
5. The identification (number, symbol or name) of the account to which each invoice is to be charged.
6. The amount of each item entered.
7. The ledger and duplicate of the remittance advice should show the old and new balances. The old balance may be eliminated from the remittance advice, although there is no real objection to having it appear thereon.

In addition to the above information, a purchase journal or purchase register should include:

1. A column for freight, cartage, or express items which are to be charged to expense and not to the cost of the particular item purchased.
2. Space for the name of vendor opposite each entry.

The information a voucher should contain is as follows:

1. Vendor's name and address.
2. The discount date of that voucher.

3. The posting media identification (invoice, debit memo, or credit memo numbers).
4. The date of each entry.
5. The identification (number, symbol, or name) of the account to which each invoice is to be charged.
6. The amount of each item entered on the voucher.
7. The old and new balances on the voucher.
8. Space for initial of machine operator preparing voucher, and for approval signatures of accounting personnel and executives in charge.

It will be noted that the information the purchase register or purchase journal should contain is identical to that specified for the same record maintained under the creditors' ledger method.

Treatment of Unclosed Vouchers Payable.—All unclosed vouchers, i.e., those upon which further transactions are to be recorded, should be carried in a file, A to Z, by vendors' names, under discount date tabs. Vouchers should be filed under a date far enough ahead of the discount date to allow for closing and mailing. Primarily, vouchers are numbered because in complete numerical sequence they provide a proof of audit for all disbursements entered on the check or disbursement register. Usually under this method vouchers are not numbered until paid. Sometimes, because of delayed payments or future datings, a voucher bearing a given number may lay over in the files so long that it becomes lost or difficult to find, and loses its identity with journal and other records. In many large installations vouchers are numbered when first prepared or opened. In such cases, the voucher number is used as a cross-reference, and is completely closed out of the unpaid voucher file each month. This is accomplished by charging vouchers payable with the total of the unpaid vouchers, and crediting a "current accounts payable" for the same amount. One of the advantages of numbering vouchers when opened, is the cross-reference by voucher number between the account

charged with the item and the credit on the voucher. The advantage of numbering vouchers as they are closed is that the "voucher register" shows all paid vouchers in the numerical order in which they were closed. The cross-reference on the accounts charged when vouchers are numbered as closed are the name or initials of the vendor, the invoice number, and the date of entry to accounts payable. If the system permits distribution on the same day that vouchers are credited, then the one date suffices. When vouchers are closed, the discount is figured and deducted from the total or balance, and a check is drawn for the net. An entry is then made on the voucher, generally at the bottom, showing the discount taken, the amount of the check, the date and number of the check.

Treatment of Prepayments to Vendors.—When prepayments to vendors are made under the creditors' ledger method, such prepayments should be entered, like any other payment, in the debit column of the vendors' ledger sheet, producing a debit balance. If the prepayment is for a special contract, a special ledger page should be set up for the vendors' account on which only the entries affecting that contract should be posted. When prepayments to vendors are made under the voucher system, such prepayments should be entered, like any other payment, in the debit column of the voucher producing a debit balance. Prepaid vouchers should be filed A to Z according to vendors' names. If the prepayment is for a special contract, a special voucher should be headed up, and only the entries affecting that contract should be posted to it.

Where Reconciliation of Indebtedness Should be Made.—In systems that function properly, whether the creditors' ledger or voucher method is adopted, all reconciliation data should be shown on the remittance advice and the voucher copies. In the case of a creditors' ledger where the duplicate of the remittance advice becomes a numerical voucher after

payment, it is proper that these data be shown on the voucher copy. In a voucher system all data of reconciliation should be shown on all three copies.

Taking up first the question of reconciliation under a creditors' ledger system, there are two general conditions, one of which applies in the case of each vendor's account: (1) when the balance shown on the vendors' ledger account is identical with the balance shown on the vendors' statement; and (2) when the balance shown on the vendors' ledger account is at variance with the balance shown on the vendors' statement.

In the first condition, where the balance on the account at date of payment equals the balance shown on the statement from the vendor, no other entry is made upon the remittance advice and voucher copies than the amount of discount taken and the net amount of the check sent in payment. It is considered good practice, when making such entries of payment, to record the date and check number on the remittance advice as well as on the ledger page, although the latter notation is not usually made on the remittance advice but is advisable for future reference.

In the second condition, cases usually arise where there are items in dispute which constitute a variance between statements issued by vendors, and the vendors' accounts as shown on the books of the vendee. There are also cases where payment of invoices is required to be deferred pending adjustment, and other cases where vendors' credit memorandums have not been received, and payment therefore is withheld on all items in dispute.

Method of Reconciliation under Ledger System.— Where the creditors' ledger system is adopted, it has been found quite essential that the creditors' ledger page should show at a glance what items have been paid, and items on which payments are being withheld pending adjustment, especially for reference purposes. All payments should be keyed

on the accounts payable record, and as a means of keying, one of the most successful methods used has been to have the person in charge of the routine indicate what items have been approved for payment, and then instruct the machine operators to mark those items on the remittance advice, voucher copy, and ledger with the "star or asterisk key" of the accounting machine used. These "stars" or "asterisks," with a brief notation upon the record, such as "Items which are not starred are not included in this settlement," enable the vendor to tell immediately what items are being paid. This procedure eliminates the necessity of writing an explanation of the unpaid items at the bottom of the remittance advice, and the writing of a letter of transmittal. Under a creditors' ledger system this reconciliation information is omitted from the ledger page, while under the voucher system the reconciliation data are handled precisely as under the creditors' ledger system, with the exception that it is considered good accounting practice to list all unpaid items on that voucher and in some manner indicate on that voucher to what other voucher such unpaid items were forwarded. When this is done, it is easy to trace an item from voucher to voucher, as it is carried along until paid.

Method of Reconciliation under Voucher System.— Under the voucher system, when payments are made to vendors, two amounts must be clearly shown in writing disbursements. The amount of the check is shown on the check register, which amount is accumulated by the machine adding registers over the total bank credit column provided for all disbursements for that day. The discount amount may also be shown on the check register, and may appear on the check if desired. The discount amount may also be accumulated by adding registers with which every accounting machine is equipped, establishing the amount of discount earned by disbursements made that day. Below are two of the possible combinations of forms that

may be made to care for these items under a creditors' ledger system.

The check may be written at one operation on a check register sheet, with the line entry registering through the check onto the check register sheet and specific columns thereon, which provide for discount earned and the amount of the check. A copy of the remittance advice may also be made to serve as a copy of the check. This is accomplished by designing a check at the top or bottom of the remittance advice so that when the check is written by machine it will align to check register ruling. The check may be separated from the remittance advice section by means of perforation, if so desired. After payment, the copy of the check with remittance advice attached, is filed in a binder provided for that purpose, and becomes a unit voucher and check register. This form has one advantage over the ordinary form of remittance advice, in that it shows an actual copy of the check and remittance advice. Where detached checks are used in a voucher system, the writing and recording of the disbursements follow identically the same routine as in the case of a vendors' ledger and duplicate remittance advice.

The writing of the check and check register is performed in one operation; or the writing of the check over the remittance advice and voucher form at one operation. Where the check is a part of the voucher, either top or bottom, the procedure is the same as that explained in the preceding paragraph.

Registration of Invoices.—Under pen practice, or in the machining of records, it is considered good accounting practice to register every invoice upon receipt. This is done on an invoice register, the pages and lines of which may be numbered. Upon being registered, the invoice is immediately given the number opposite its registration entry, and is so stamped. Registration of invoices varies in extent from the date of the invoice, the vendor's name, and the amount of the invoice,

to a wider registration which may also show the accounts to which that invoice is to be charged. In some instances, the registration of the invoice may be combined with the making of a maturity tickler or due-date register.

Use of Maturity Tickler.—The maturity tickler referred to is a memorandum record of invoices showing on what dates the invoices must be paid in order that discount may be taken advantage of, and can be prepared in the process of invoice registration at one writing. There is another method of maintaining a maturity tickler, and that is to make the regular invoice register in duplicate, filing one copy by the first discount date shown thereon. When the payments for that date are taken care of, this copy of the invoice register is then moved forward to the next maturity date. In this way each sheet of the invoice register becomes a traveling tickler through the files, turning up the payments for each particular discount date to which it has been assigned. Another method is to insert a card at the time of making entry to invoice register, noting thereon the date that the particular invoice is discountable. This card is then filed by discount date. Still another method is to simply maintain a "discount date register or maturity tickler" for each payment date, upon which are entered all invoices that are due and discountable on that date.

Method of Checking Invoices.—Checking invoices or auditing invoices is the work of determining if proper accounting has been made of all the goods for which the management is being charged by a vendor, as well as the checking of the invoices as to prices and extensions, etc., against the original purchase order on which the goods were shipped. This function of checking invoices is performed in one of two ways: either the original invoice, or a copy thereof, as received from vendors is used for all checking and figuring, or receiving reports are prepared and these are checked against the invoices as received from vendors.

After the incoming invoices have been registered, they should be sent to the purchasing department or to the receiving room. It is often found practicable to demand duplicate invoices from vendors and hold the original in the accounting department while the duplicate is being approved. When the goods are received, the actual contents of the packages are checked against the invoices, and shortages or overages are noted thereon. The corrected invoice, or copy thereof, is returned to the accounting department, and is the basis for debit and credit memorandums (special forms), which are then issued.

This method has two disadvantages. The first of these is that clerks in a receiving department are often careless, and check an invoice for fully received when such is not the case. The second objection is that sending the invoice to the receiving department inevitably reveals to minor clerks and such help the prices that are being paid for merchandise purchased.

Under the method of checking invoices from receiving reports, the vendor is generally presumed to have sent with each package a packing slip showing the contents thereof. Upon the receipt of the goods, the receiving department writes a receiving report showing the vendor's name, the purchase order number, vendor's invoice number, and a list of the merchandise in the shipment. Particular note is made on the receiving report of any discrepancy between actual receipts and the list shown on the vendor's packing slip. Copies of this receiving report are usually dispatched to the purchasing and accounting departments. In these departments the verification or checking is accomplished by matching the actual receipts as shown on the receiving reports with the invoices received from the vendors.

Treatment of Unaudited Invoices.—The third question in line is: Can the liability representing invoices still in the invoice checking department, be controlled by maintaining a general ledger account known as unaudited invoices control account?

The answer to this question is vital to the extent that it determines the routing of all control figures and the sorting and totaling steps necessary in the invoice checking department. An unaudited invoice control account reveals the sum total of the company's liability in the form of invoices from vendors which have been regularly registered and accepted as a liability but which have not been passed for payment or for distribution to the proper accounts to be debited. This controlling account is used where registry is made of incoming invoices as they are passed to an invoice checking department for auditing. Its main object is to reveal what part of the recognized liability of the company is still in process of audit at the time of closing the books each month. As invoices are audited in the invoice checking department, they are added, and their total is credited to this controlling account. The "test" check is made when all invoices in the invoice checking department files are listed to see if the sum arrived at equals the total shown on the "unaudited invoice" controlling account.

Treatment of Goods in Transit.—The fourth question to be asked is: Are invoices paid before the arrival of goods, and are such invoices charged to a controlling account known as goods in transit control account?

The answer to this question bears vitally on the records that are to be machined. It also determines the planning of the routine so as to match adequately this controlling account with detail records maintained. The goods in transit control account is a current account which reveals in total that part of the liability of the company which has been credited to the vendors' individual accounts, for which goods have not been received.

Distribution of Vendors' Invoices.—The fifth and final question to be answered is: Are invoices received from vendors which are to be charged to two or more accounts?

There are two general methods in use for accounts payable and distribution. First, the unit invoice system in which the sum total of each invoice is chargeable to a given account; and second, the split invoice system in which incoming invoices, after being credited to the vendors, are distributed by items or nature of expense and are charged to several accounts. Typical of the latter is an expense invoice for electricity of a department store, which is allocated over the entire store.

The charts illustrated in this chapter attempt to show that where invoices are received for each account to be charged, the routine will permit the establishment of predetermined totals on all controlling distribution accounts. In the case of split invoices the same answer is arrived at, only the method forced by the splitting of the invoices necessitates the establishment of after-determined totals which are posted to the controlling distribution accounts.

Why Cross-References Should Be Established.—In handling accounts payable and their distribution on a unit basis by mechanical accounting methods, there is one factor that must be remembered by the person installing such a system if success is to be assured. A perfect cross-reference must be established between the entries recorded in different records. In other words, all the accounts payable records must show for what particular unit account each item has been purchased, and each unit account of the distribution ledger must show from what vendor or other source that item was received. If this is done, all of the complicated work of tracing charge backs, and identifying transfers, debit and credit memorandums will be simplified. More important even than this, the professional accounting firm, which undertakes the audit of books maintained under machine accounting methods, will be able to trace disbursements accurately and quickly through the records.

It is customary to have on the invoice register a column in which is entered the identification of the unit account to which

that item is to be charged. It is also customary on a distribution record to have a column headed "Contra," in which is entered the vendor's initials, or the number of the voucher in the invoice register on which that item has been previously entered. In this column is also entered the identification of any account to which entry is made in the case of transfers.

Some users of mechanical accounting equipment, where the voucher system has been adopted, enter on the distribution record both the initials of the vendor and the numbers of the vouchers. Where distribution entries are made on different dates from the entry of the same items to the vendors' accounts, the auditing of the books is materially assisted by entering on the distribution record the date of entry to the vendors' accounts, in addition to the other data specified above.

Systems of Accounts Payable and Distribution

The following routines are submitted in further explanation of the various plans that may be used in mechanical accounting applications of accounts payable and distribution systems.

Ledger System.—Chart shown in Figure 23 illustrates the principle where no liability is recognized until after the goods are received and checked; hence all invoices, expense bills, purchase orders, and receiving reports should go first to an invoice checking department so that they may be audited together. The only accounting record that is necessary to have of them in the invoice checking department is a pen-kept invoice register, from which they take their consecutive numbers.

Once the invoices are recognized as a liability, proper provision must be made for controlling them on both the credit and debit controlling accounts in the general ledger. Adequate records and the smoothest routing must be provided in order to care properly for the detail debit and credit unit postings.

To effectively provide for the control data wanted, the usual

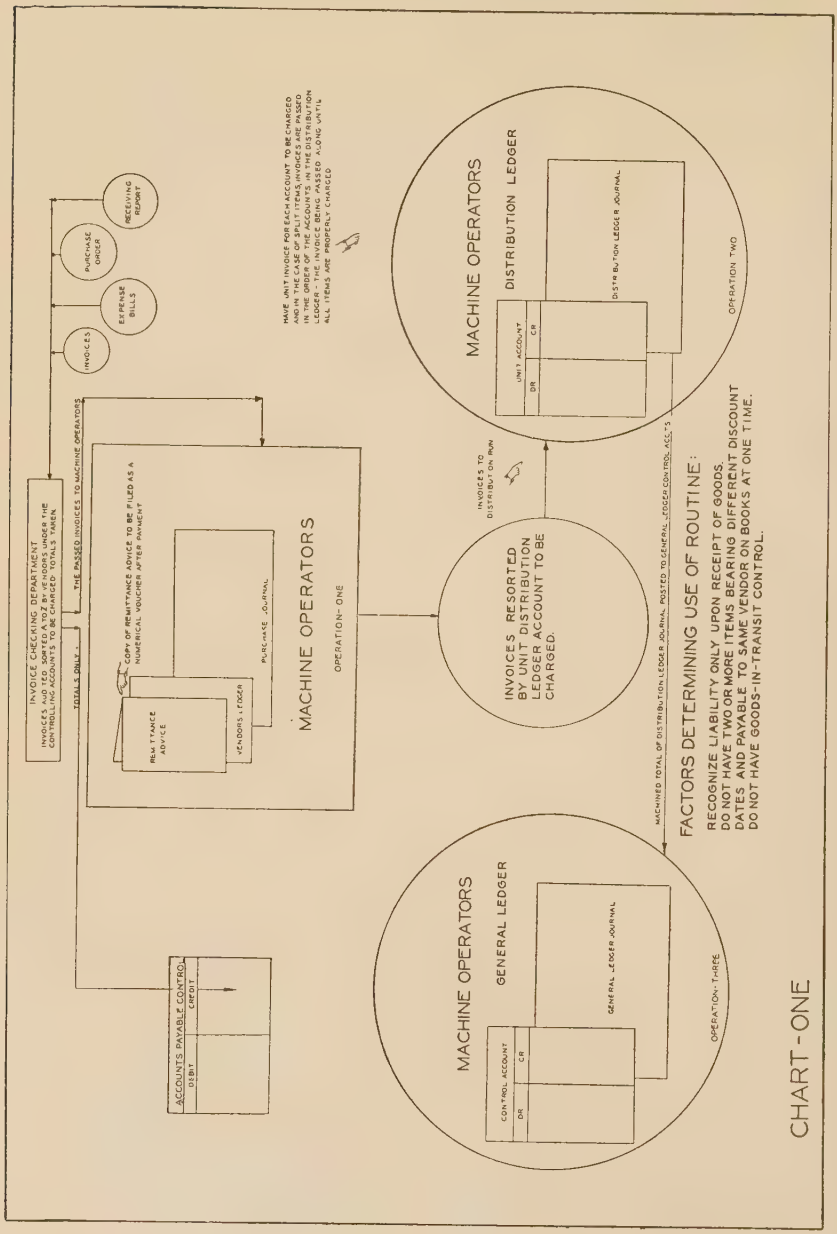


CHART - ONE
INVOICE CHECKING DEPARTMENT
INVOICES AND ITEMS SHOULD BE PROPERLY CHARGED UNDER THE CONTROLLING ACCOUNTS TO BE CHARGED TOTALS TAKEN.
TOTALS ONLY
THE PASSED INVOICES TO MACHINE OPERATORS
INVOICES
EXPENSE BILLS
PURCHASE ORDER
RECEIVING REPORT
HAVE UNIT INVOICE FOR EACH ACCOUNT TO BE CHARGED ARRANGED IN THE SAME SEQUENCE AS THE ACCOUNTS IN THE ORDER OF THE ACCOUNTS IN THE DISTRIBUTION LEDGER - THE INVOICE BEING PASSED ALONG UNTIL ALL ITEMS ARE PROPERLY CHARGED
COPY OF REMITTANCE ADVICE TO BE FILED AS A NUMERICAL VOUCHER AFTER PAYMENT
REMITTANCE ADVICE
VENDORS LEDGER
PURCHASE JOURNAL
MACHINE OPERATORS
OPERATION - ONE
ACCOUNTS PAYABLE CONTROL
DEBIT
CREDIT
INVOICES TO DISTRIBUTION RUN
INVOICES RESORTED BY UNIT DISTRIBUTION LEDGER ACCOUNT TO BE CHARGED.
MACHINE OPERATORS
DISTRIBUTION LEDGER
UNIT ACCOUNT
DR
CR
DISTRIBUTION LEDGER JOURNAL
OPERATION TWO
MACHINED TOTAL OF DISTRIBUTION LEDGER JOURNAL POSTED TO GENERAL LEDGER CONTROL ACCTS
FACTORS DETERMINING USE OF ROUTINE:
RECOGNIZE LIABILITY ONLY UPON RECEIPT OF GOODS.
DO NOT HAVE TWO OR MORE ITEMS BEARING DIFFERENT DISCOUNT DATES AND PAYABLE TO SAME VENDOR ON BOOKS AT ONE TIME.
DO NOT HAVE GOODS-IN-TRANSIT CONTROL.
MACHINE OPERATORS
GENERAL LEDGER
CONTROL ACCOUNT
DR
CR
GENERAL LEDGER JOURNAL
OPERATION - THREE

Figure 23. Accounts Payable Routine Chart—based on recognition of liability upon receipt of goods and where invoices do not have two or more items bearing different discount dates payable to same vendor

general ledger control of accounts payable purchases is maintained, to which will be credited daily, in totals only, the sums of the various blocks of invoices that are passed for posting from the invoice checking department. Each general division of purchase and expense accounts which are to be debited will be charged daily with the totals of all invoices which are distributed throughout their respective sections of the distribution ledger.

The machined records in the accounts payable department consist of a remittance advice in duplicate, the original of which is sent with check as payment to the vendor, while the copy becomes the voucher record and should be filed in straight numerical sequence for audit against the check register. The ledger copy is the continuous record of the transactions with that individual vendor; and the purchase register copy represents a journal of that day's purchases.

The distribution ledger record consists of as many divisions in the posting tray or binder as there are distribution controlling accounts, and a debit and credit journal for each division. There may be but one journal with a few lines of blank space separating the different classes of entries. Under each division in the tray each unit expense or merchandise account is arranged consecutively by numbers (these numbers follow the chart or classification on accounts).

We will assume that fifty invoices, together with the other necessary information, arrive in the invoice checking department for audit. Shortages are noted and debit memorandums are prepared therefor. The invoices are segregated according to each controlling division of the accounts to be debited. Each of the groups is sorted A to Z by vendors' names. A grand total of the entire fifty invoices is then taken on an adding machine tape. This total is posted to the credit of accounts payable account in the general ledger.

The fifty invoices referred to are then passed to the accounting machine operator, who posts from them to the dupli-

cate remittance advice, creditors' ledger, and purchase register. When the operator reaches the end of the first group, the machine total is entered on the purchase register. In a like manner the operator secures the total amount chargeable to each of the other distribution controlling accounts.

The grand total of the subdivisions on the purchase register must equal the sum posted to the accounts payable control, which establishes a positive check of the total postings of the credits.

From the purchase register the accounting machine totals for each distribution controlling division are posted to the general ledger controlling accounts, thus setting up predetermined totals for the distribution machine to meet.

From the accounts payable department the invoices are sent to the distribution ledger machine operator. They are first sorted by unit account numbers, and are then posted to the unit ledger accounts. As they are posted on the distribution ledger unit accounts, a journal of the postings is automatically created on the distribution of invoice record. The total of the debit column of this journal must equal the predetermined totals which have already been posted to the distribution controlling accounts in the general ledger.

This system affords an automatic check in every step of the procedure each day. The journal total of the postings to the accounts payable ledger must equal the accounts payable control credit total. The totals of the postings to the unit accounts of the distribution ledger must equal other totals arrived at by a separate adding of the accounts payable sheet.

Each day's work is done that day, and the end-of-the-month peak load of balancing a columnar purchase record and posting to unit ledger accounts is eliminated.

Voucher System.—Chart in Figure 24 is identical with the chart in Figure 23, with the exception that an affirmative answer to question 2, i.e., do invoices that are payable to the

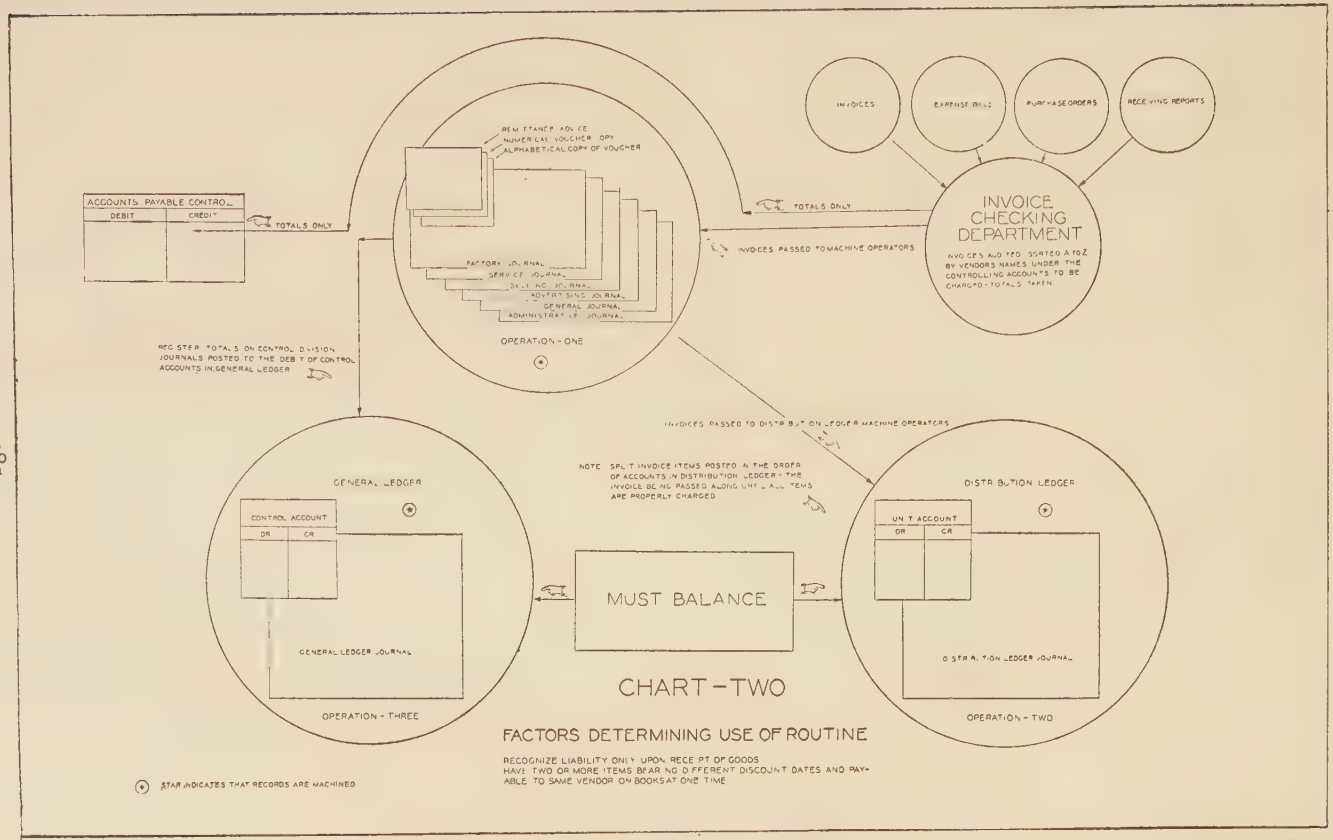

INVOICES
EXPENSE BILLS
PURCHASE ORDERS
RECEIVING REPORTS
INVOICE CHECKING DEPARTMENT
INVOICES AUDITED SORTED A TO Z BY VENDORS NAMES UNDER THE CONTROLLING ACCOUNTS TO BE CHARGED - TOTALS TAKEN
TOTALS ONLY
INVOICES PASSED TO MACHINE OPERATORS
REMITTANCE ADVICE
NUMERICAL VOUCHER COPY
ALPHABETICAL COPY OF VOUCHER
FACTORY JOURNAL
SERVICE JOURNAL
SELLING JOURNAL
ADVERTISING JOURNAL
GENERAL JOURNAL
ADMINISTRATIVE JOURNAL
OPERATION - ONE
ACCOUNTS PAYABLE CONTROL
DEBIT
CREDIT
TOTALS ONLY
REGISTER TOTALS ON CONTROL DIVISION JOURNALS POSTED TO THE DEBIT OF CONTROL ACCOUNTS IN GENERAL LEDGER
INVOICES PASSED TO DISTRIBUTION LEDGER MACHINE OPERATORS
NOTE SPLIT INVOICE ITEMS POSTED IN THE ORDER OF ACCOUNTS IN DISTRIBUTION LEDGER - THE INVOICE BEING PASSED ALONG UNTIL ALL ITEMS ARE PROPERLY CHARGED
GENERAL LEDGER
CONTROL ACCOUNT
DR
CR
GENERAL LEDGER JOURNAL
OPERATION - THREE
MUST BALANCE
DISTRIBUTION LEDGER
UNIT ACCOUNT
DR
CR
DISTRIBUTION LEDGER JOURNAL
OPERATION - TWO
CHART - TWO
FACTORS DETERMINING USE OF ROUTINE
RECOGNIZE LIABILITY ONLY UPON RECEIPT OF GOODS
HAVE TWO OR MORE ITEMS BEARING DIFFERENT DISCOUNT DATES AND PAYABLE TO SAME VENDOR ON BOOKS AT ONE TIME
STAR INDICATES THAT RECORDS ARE MACHINED

Figure 24. Accounts Payable Routine Chart—based on recognition of liability upon receipt of goods and where invoices have two or more items being different discount dates payable to same vendor

same vendor bear different discount dates for two or more items thereon, makes a triplicate voucher advisable instead of a creditors' ledger and duplicate remittance advice. The written routine for chart in Figure 23 applies to chart in Figure 24. Columnar ruling on the triplicate voucher forms is identical with the columnar ruling on the creditors' ledger forms of chart in Figure 23.

Ledger System Showing Unaudited Invoice Control Feature.—Routine chart shown in Figure 25 introduces a new factor in handling accounts payable and distribution that is not found in charts in Figures 23 and 24. This factor is a general ledger controlling account known as unaudited invoices control. The balance on this controlling account is intended to show continuously that portion of unpaid vendors' invoices that have been recognized as a liability but which have not been passed for payment by the invoice checking department; i.e., the balance of unaudited invoices control is a total figure representing the sum of all invoices and credit memorandums held in the invoice checking department.

Its chief intent is to place a strict control on the handling of invoices as they are received from vendors. The accounts payable forms to be used under these conditions are: a duplicate remittance advice, the original of which is sent with check for payment to the vendor, and copy of which becomes a numerical voucher for audit against check register; a creditors' ledger page; and a purchase register or journal.

The duplicate remittance advice and creditors' ledger should have columns showing old balance, date, invoice, number, memo, for, credit, debit, and balance. In addition to this columnar information, the purchase register should provide space for the name of the vendor and a column for the accumulation of "expense freight and cartage."

The distribution records should consist of: a unit distribution ledger page which shows in columns old balance,

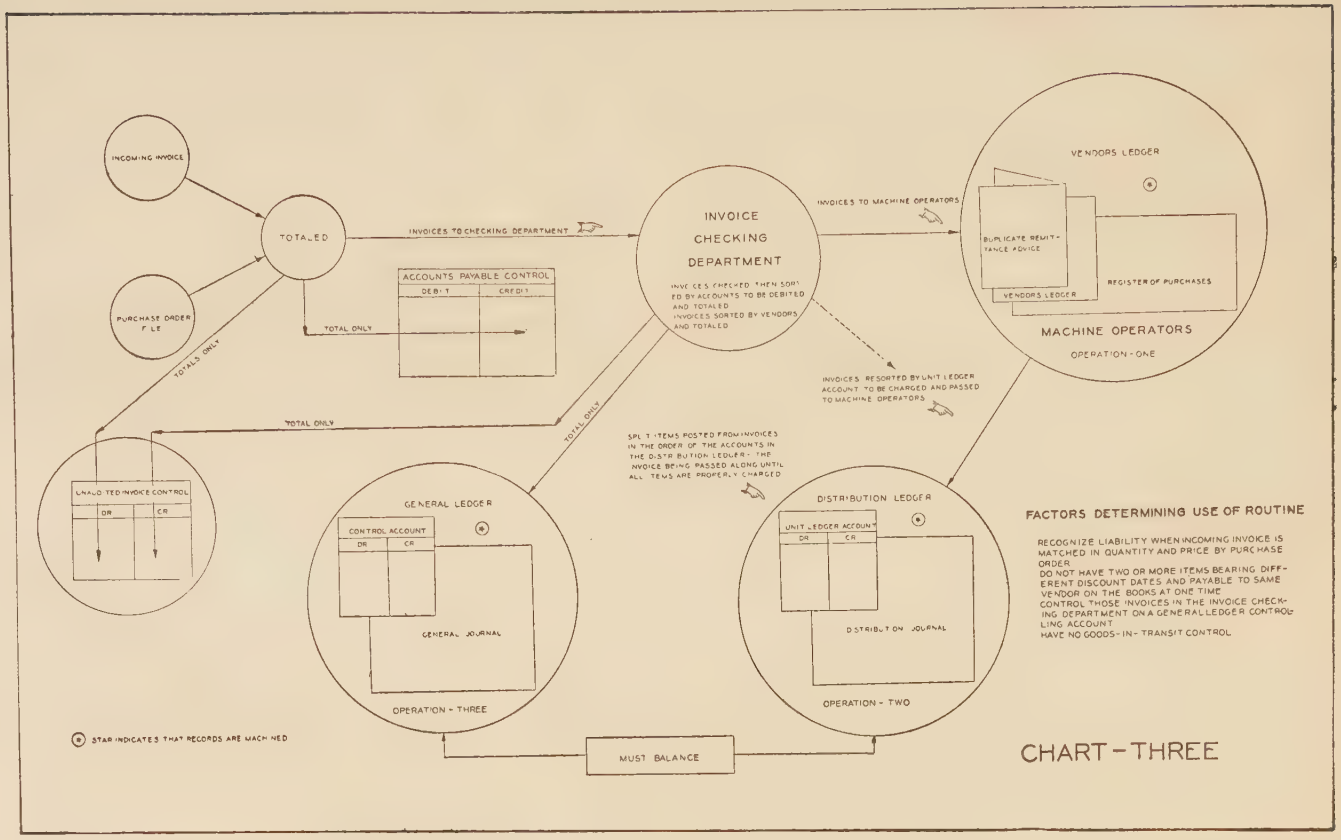

INCOMING INVOICE
PURCHASE ORDER FILE
TOTALED
INVOICES TO CHECKING DEPARTMENT
TOTALS ONLY
TOTAL ONLY
ACCOUNTS PAYABLE CONTROL
DEBIT
CREDIT
INVOICE CHECKING DEPARTMENT
INVOICES CHECKED THEN SORTED BY ACCOUNTS TO BE DEBITED AND TOTALED
INVOICES SORTED BY VENDORS AND TOTALED
INVOICES TO MACHINE OPERATORS
VENDORS LEDGER
DUPLICATE REMITTANCE ADVICE
VENDORS LEDGER
REGISTER OF PURCHASES
MACHINE OPERATORS
OPERATION - ONE
INVOICES RESORTED BY UNIT LEDGER ACCOUNT TO BE CHARGED AND PASSED TO MACHINE OPERATORS
TOTAL ONLY
TOTAL ONLY
SPLIT ITEMS POSTED FROM INVOICES IN THE ORDER OF THE ACCOUNTS IN THE DISTRIBUTION LEDGER - THE INVOICE BEING PASSED ALONG UNTIL ALL ITEMS ARE PROPERLY CHARGED
UNAUDITED INVOICE CONTROL
DR
CR
GENERAL LEDGER
CONTROL ACCOUNT
DR
CR
GENERAL JOURNAL
OPERATION - THREE
DISTRIBUTION LEDGER
UNIT LEDGER ACCOUNT
DR
CR
DISTRIBUTION JOURNAL
OPERATION - TWO
FACTORS DETERMINING USE OF ROUTINE
RECOGNIZE LIABILITY WHEN INCOMING INVOICE IS MATCHED IN QUANTITY AND PRICE BY PURCHASE ORDER
DO NOT HAVE TWO OR MORE ITEMS BEARING DIFFERENT DISCOUNT DATES AND PAYABLE TO SAME VENDOR ON THE BOOKS AT ONE TIME
CONTROL THOSE INVOICES IN THE INVOICE CHECKING DEPARTMENT ON A GENERAL LEDGER CONTROLLING ACCOUNT
HAVE NO GOODS-IN-TRANSIT CONTROL
STAR INDICATES THAT RECORDS ARE MACHINED
MUST BALANCE
CHART - THREE

Figure 25. Accounts Payable Routine Chart—based on recognition of liability upon receipt of invoice and where that invoice does not have two or more items bearing discount dates payable to same vendor

date, number, memo, contra, debit, credit, and balance; and a debit and credit journal of distribution which in addition to the information shown on the unit ledger account contains necessary space for the name or number of the account posted to.

Independent or general ledger controlling accounts for accounts payable purchases, unaudited invoices, and one for each of the main controlling divisions to which purchases are charged, are kept under this plan. Debit totals entered to distribution controls daily must balance to credit totals entered to Accounts Payable Purchases.

The accounts payable ledger is arranged A to Z by vendors' names, special prepayment contract amounts being carried immediately back of the vendor's regular ledger page. The distribution ledger record consists of unit ledger accounts arranged in a posting tray or binder so that the accounts of each control group are together.

Operation 1. An incoming invoice is matched in quantity and price with a copy of the purchase order, which has been previously issued. When this matching is accomplished, the invoice is recognized as a liability. Hence, a total of all invoices so matched is taken and carried to the credit of accounts payable purchases on the accounts payable purchases controlling account. At the same time this total is entered to the debit of unaudited invoices controlling account. The invoices are sent to the invoice checking department. The entering of these totals and the passing of the invoices to the invoice checking department constitutes the first step in the routine as it brings the accounting to a "positive check"—the debit offsetting the credit and the balance on the unaudited invoice control representing the sum of all invoices in the invoice checking department.

Operation 2. In the invoice checking department the invoices are audited against the receiving reports, checked for extensions, debit and credit memorandums are instituted, and

the invoices are then sorted into groups representing the controls of the final debit distribution. Totals are then taken of each group, and these totals are entered to the debit of each individual controlling account. A grand total of the groups is taken and entered to the credit of the unaudited invoice control account.

The invoices are then sorted A to Z by vendors' names and passed to the accounting machines, where they are entered upon the duplicate remittance advice, creditors' ledger, and purchase register. At the conclusion of the run the machine operator registers total as shown on the purchase register, which is checked against the total credit that has been previously entered on the unaudited invoice control.

Operation 3. The accounting machine operator passes the invoices to the distribution machine operator, where they are resorted by accounts to be charged and posted in this order. As the postings to each control division of the distribution ledger are finished, the machine operator enters that division's register totals on her debit and credit journal of distribution. The totals of each division of the journal distributions are then checked against the predetermined total which has been previously entered to the debit and credit of the corresponding controlling account. A grand total of the distribution controlling totals must check to the sum previously entered to the credit of unaudited invoices.

Under this system a continuous balance is maintained between controlling accounts. A debit to unaudited invoices first offsets the credit to accounts payable purchases, and then the credit to unaudited invoices is offset by the debits entered on the various permanent distribution controls. The detail credits entered on the accounts payable records are offset by the detail debits entered on the unit distribution ledger accounts.

Accounting Treatment of Goods in Transit.—Chart in Figure 26 illustrates the principle of recognizing liability the

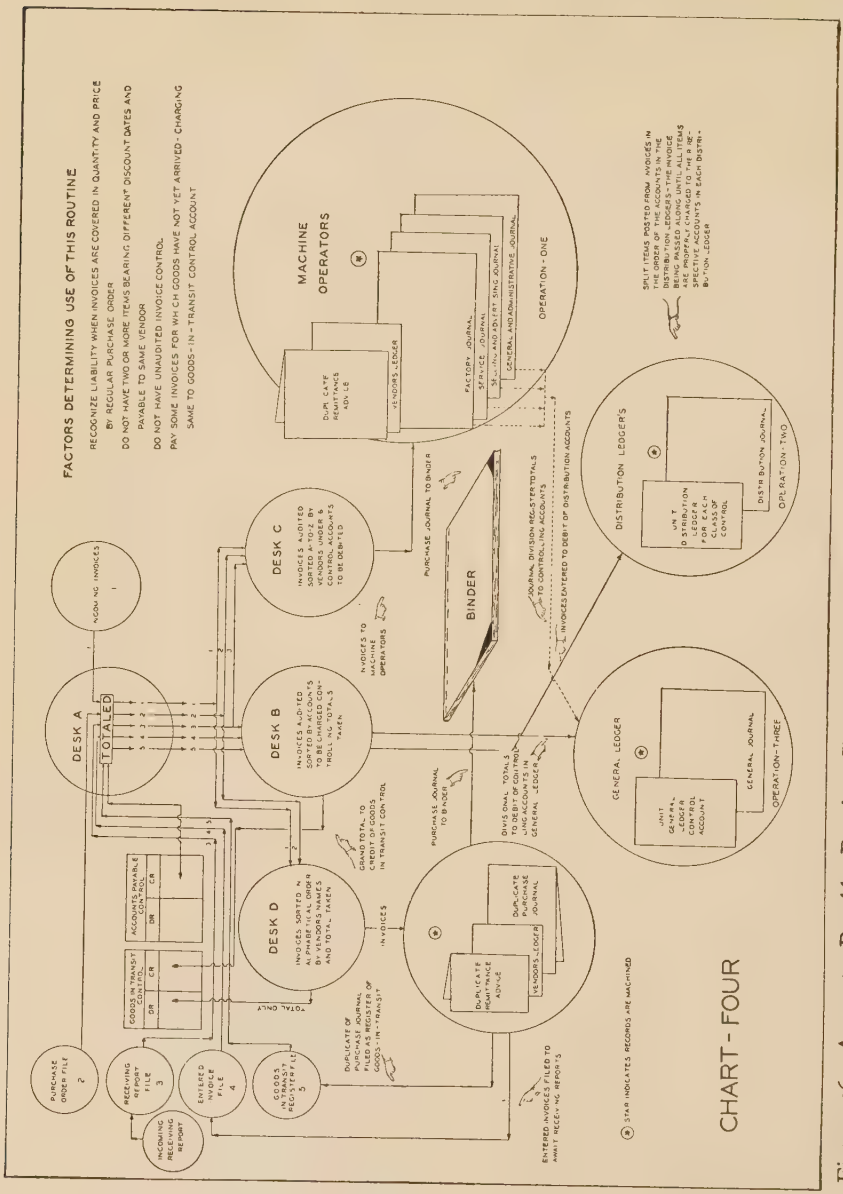

FACTORS DETERMINING USE OF THIS ROUTINE
RECOGNIZE LIABILITY WHEN INVOICES ARE COVERED IN QUANTITY AND PRICE
BY REGULAR PURCHASE ORDER
DO NOT HAVE TWO OR MORE ITEMS BEARING DIFFERENT DISCOUNT DATES AND PAYABLE TO SAME VENDOR
DO NOT HAVE UNAUDITED INVOICE CONTROL
PAY SOME INVOICES FOR WHICH GOODS HAVE NOT YET ARRIVED - CHARGING SAME TO GOODS - IN - TRANSIT CONTROL ACCOUNT
DESK A
TOTALED
DESK B
DESK C
DESK D
BINDER
MACHINE OPERATORS
DISTRIBUTION LEDGERS
GENERAL LEDGER
PURCHASE ORDER FILE 2
RECEIVING REPORT FILE 3
ENTERED INVOICE FILE 4
GOODS IN TRANSIT REGISTER FILE 5
INCOMING RECEIVING REPORT
ACCOUNTS PAYABLE LEDGER
GOODS IN TRANSIT LEDGER
VENDORS LEDGER
DUPLICATE REMITTANCE ADVICE
DUPLICATE PURCHASE JOURNAL
PURCHASE JOURNAL TO BINDER
INVOICES TO MACHINE OPERATORS
GRAND TOTAL TO CREDIT OF GOODS IN TRANSIT CONTROL
DIVISIONAL TOTALS TO DEBIT OF CONTROLLING ACCOUNTS IN GENERAL LEDGER
JOURNAL DIVISION REGISTER TOTALS TO CONTROLLING ACCOUNTS
INVOICES ENTERED TO DEBIT OF DISTRIBUTION ACCOUNTS
DUPLICATE OF PURCHASE JOURNAL FILED IN BINDER OF GOODS - IN - TRANSIT
ENTERED INVOICES FILED TO AWAIT RECEIVING REPORTS
STAR INDICATES RECORDS ARE MACHINED
SPLIT ITEMS POSTED FROM INVOICES IN THE ORDER OF THE ACCOUNTS IN THE DISTRIBUTION LEDGERS - THE INVOICE BEING HELD ALONG UNTIL ALL ITEMS ARE POSTED AND THE TOTALS OF THE RESPECTIVE ACCOUNTS IN EACH DISTRIBUTION LEDGER
CHART - FOUR

Figure 26. Accounts Payable Routine Chart—based on recognition of liability upon receipt of invoice and the accounting treatment of goods in transit

moment an incoming invoice is matched in quantity and price with a copy of the regular purchase orders. This recognition automatically divides the invoice into two classes: (1) invoices for which there are receiving reports and which may be audited immediately; and (2) invoices for which there are no receiving reports and which must necessarily be recognized as goods in transit until the arrival of the goods has been evidenced by proper receiving reports.

In order to control and handle properly each day's work on that day, the following procedure and records are necessary.

There are four main files, as illustrated:

Key 2—Purchase Order File
Key 3—Receiving Report File
Key 4—Entered Invoice File
Key 5—Goods in Transit Register File

Independent or general ledger controlling accounts are kept for accounts payable purchases, goods in transit, and one each for the main controlling divisions to which the purchases are debited.

There is usually maintained one controlling desk or division and three subsidiary desks or divisions in the department for the handling of the work (see Figure 26), duties of which are outlined as follows:

Desk A. Accounts Payable Auditor—responsible for the accounts payable control figures and the direction of, and results obtained by, the other three divisions.

Desk B. To handle exclusively invoices and receiving reports in the case of liabilities which have already been entered to accounts payable but which have not been properly debited to the distribution accounts (goods in transit).

Desk C. To handle all incoming invoices for which there are both purchase orders and receiving reports.

Desk D. To handle all incoming invoices for which there are regular purchase orders, but for which the correct receiv-

ing reports have not been received (those to be charged to goods in transit).

The distribution ledger record consists of unit ledger accounts arranged in a posting tray or binder so that the accounts of each control group are together. Postings to these distribution ledgers originate, as far as accounts payable are concerned, from two sources:

Desk B. Audited invoices, which have been charged to goods in transit, pending the arrival of the receiving reports, and for which the receiving report is now in.

Desk C. Audited invoices which have been regularly audited and credited to accounts payable and which are now ready for the distribution debit.

Three general conditions arise:

1. Invoices on hand for which there are both purchase orders and receiving reports, and which may be passed and audited immediately.
2. Invoices on hand for which there are purchase orders, but for which there are no receiving reports.
3. Receiving reports on hand covering invoices which have already been credited to accounts payable and charged to goods in transit.

In order, the routine in each case is as follows:

An incoming invoice arrives at desk A, where it is matched with purchase order and receiving report, and the three are clipped together and sent to desk C. At desk C invoices are arranged A to Z by vendors' names, under the controlling accounts to be charged. Proper debit and credit memorandums are instituted, and the invoices, thus arranged, are then passed to the accounts payable bookkeeping machines.

The accounts payable operator then posts in the order in which the invoices are received, transcribing by machine the totals from the machine registers to the purchase register at the end of each of the control groups. After posting, the invoices are passed to the machine operators on the distribution

ledger, and the purchase register is returned to the person in control of desk C. From this purchase register, the person in control of desk C makes the proper debit entries on the distribution controls.

The distribution ledger machine operator, upon receipt of the invoices from the accounts payable operator, posts them, in order, to the unit expense and merchandise accounts of the distribution ledger, keeping separate totals for each of the ledger controlling divisions. Each posting must bear the individual invoice number and amount, as well as the initials of the vendor from whom the goods were purchased.

The person in charge of desk C is charged with the responsibility of seeing that the total posting to each distribution ledger division, as shown by the debit and credit journal, equals the daily postings of totals which have been made from the accounts payable register.

Incoming invoices arriving at desk A are matched with the purchase order, and the two sent to desk D.

At desk D, the invoices are sorted A to Z by vendors' names, and the total is taken. The person in charge of desk D enters each block total to the debit of goods in transit on the general ledger goods in transit control. The invoices thus arranged are sent to the accounts payable machine operators.

In posting all invoices which come from desk A to the credit of the vendors, the machine operator should have duplicate purchase registers in the machine at the time of posting. After entry the invoices are filed A to Z by vendors' names in file "4" as indicated above. The copy of the purchase register is filed consecutively by dates in file "5." The original of the purchase register is bound in the purchase journal. Regardless of whether all invoices are supported by receiving reports, the person in charge of desk A is charged with the responsibility of adding all invoices which are passed to desks C and D, and of crediting the total of same to the control of accounts payable on the general ledger accounts payable control.

In every case, the distribution machine operator should post the invoice number, the vendor's initials, and the unit amount of each invoice.

Incoming receiving reports, arriving at desk A, are of two classes:

1. Those for which no invoices have yet arrived. These are filed in the receiving report file.

2. Those for which invoices have already gone through accounts payable and have been charged to goods in transit. Upon receipt of these reports the person in charge of desk A pulls the entered invoice from the entered invoice file, "4," and checks the item off of the purchase register file, "5," using the date and his initials as a check mark. The receiving reports and invoices are then passed to desk B.

The person in charge of desk B makes the audit, institutes the necessary debit and credit memorandums, and groups the posting data under the controlling accounts to be debited. Separate totals of each group are taken, as well as a grand total. This grand total is posted to the credit of goods in transit on the goods in transit control, and each control group total is debited to its proper distribution control. The invoices thus arranged are then sent to the distribution machine for posting.

The distribution machine operator posts these mediums as arranged, to the distribution ledger, establishing separate journal totals for each ledger control division. Upon completion of the run the operator returns the journal to the person in charge of desk B, where the machine totals are checked against the predetermined totals already posted to the controls.

Where question 2 (i.e., do invoices that are payable to the same vendor bear different discount dates for two or more items thereon) is answered in the affirmative, it is advisable to use a voucher system instead of a creditors' ledger system as accounts payable forms.

This voucher is written in triplicate, the original going

with check for payment as a remittance advice to the vendor, the duplicate becoming a numerical voucher record with approved invoices attached after payment, and the triplicate becoming the alphabetical or indexed record of transactions with that vendor. The remittance advice section of the voucher, where check is attached, should be ruled in identically the same manner as a creditors' ledger page. The purchase journal follows the same rulings as the journal used in a creditors' ledger system, with the exception that provision should be made for entering the voucher number as well as the name of the vendor, after each transaction.

Where there are but a few invoices chargeable to more than one account, and where the bulk of the invoices pass through the accounting department on a unit basis, it is not considered advisable to vary from the standard routine. Where only a few items are to be charged to more than one account, it has been found to work to better advantage to handle them in the accounts payable department on a separate or "miscellaneous" run, and then distribute them to the unit distribution accounts on a similar "miscellaneous" run. Successful systems are built on conditions that will permit the great bulk of the work to be performed in a uniform manner, but will also permit special provisions for handling exceptions to the general conditions.

Method of Handling Split Invoices.—Where split invoices are in such a proportion to the whole that the entire routine of accounts payable and distribution must be planned to handle them, it will be found that the logical thing to do is to follow identically the same routine as is employed in pen practice—resulting in after-determined totals for posting to the general ledger distribution controls.

The routine employed in handling split invoices is identical to routines "1," "2," "3," and "4," except that the invoices are not segregated into controlling groups in the invoice check-

ing department, but are carried in one arrangement of A to Z by vendors' names. After posting to accounts payable the invoices are resorted by the unit distribution accounts to be charged. The invoices which have more than one charge on them are placed in one group in the order of the accounts to be affected, and after posting to the first account, are moved forward to the next account to be posted, etc., until all items on the invoices are posted and checked off.

As the machine operator posts these items to the unit distribution accounts, the machine automatically accumulates the totals which are chargeable to each distribution control division. The totals shown in the machine registers upon the completion of the entire run of postings to the unit accounts establish the control divisions in the distribution ledgers. The debit and credit journal of distribution sheets are then added, and their sum checked against the previous total arrived at by the accounts payable machine. If they are found to be correct, they are entered on the proper general ledger controlling accounts.

In some cases where trays are used, invoices are not resorted, but are distributed to the unit distribution accounts in exactly the same order in which they were previously posted to accounts payable. While this makes a more rapid check in case of error, it adds greatly to the volume of work of posting to distribution unit accounts. In every case that a posting is made, it means that the operator must pick up the old balance and extend the new, whereas by resorting it is often possible for the operator to pick up the old balance and enter thirty or forty items before extending the new balance.

It might be well to point out that under this system of distribution no predetermined check is established to test postings of distribution items to the proper accounts, but it must be remembered that under pen methods, the bookkeeper takes no predetermined total by distribution divisions. Items are en-

tered to the credit of the vendors on one side of the purchase journal, and debited to unit accounts in controlling account columns on the other side of the same journal. When it is desired to secure a controlling total, all items that have been entered in that controlling division's column are merely listed. This listing is equivalent to the total which shows on the control division machined records, which are credited by the operator in the process of posting.

Importance of Accounting Control.—When accounting is placed on a machine basis, the first thing to be safeguarded is the accuracy of the results to be obtained. No record can be proved against itself. Every accounting system must be built upon a foundation of sane checks, where the detail record is checked against a controlling account, where one person's result must balance the results obtained by some other person. There must be independent controls of the machine and the operator—something for them to prove against.

The controlling accounts herein described, against which are checked all the predetermined totals of the day's work, must be compared with the machine operator's result. It is against this permanent record of these predetermined totals that the machine must prove when the run of entries is completed. This general ledger or independent control is very essential to good accounting practice. Without some such record, no proof of the machine work can be obtained without minute comparison of the entire mass of detail composing the period's transactions. The fitting together of skeleton controls as heretofore explained, and the machine-made detail records, comprise the end toward which all should strive.

Factors Governing Columnar Distribution Methods.—There are many small concerns which maintain columnar distribution in connection with accounts payable routines, and where such is the case, the individual engaged in the constructive work has only to bear in mind the following conditions in ar-

ranging variations as shown by the charts illustrated in Figures 27, 28, 29, and 30.

For columnar distribution the purchase record, proof, or register sheet written at the time posting to the unit records of accounts payable is made, must be so designed as to provide the necessary columns for the controlling distribution accounts as indicated in the charts in Figures 27–30. Adding registers or totalizers are carried over these columns and the items posted to accounts payable are distributed into the controlling account columns and marked for the unit accounts under those controls at the time the posting is made to accounts payable. This is the first variation to be noted from the unit plan, i.e., that of a continuous total of the amounts chargeable to the control as the operator progresses on one continuous run of postings through accounts payable. Under the unit plan, these totals are secured by segregating the accounts payable run into smaller units, each unit dealing with a distribution controlling account.

The second variation concerns the factor of split invoices. An invoice chargeable to two or more accounts can easily be distributed to two or more distribution controlling columns.

The third variation is that under the unit plan each item posted to accounts payable is distributed to its final unit account daily, whereas under the columnar method no effort is made to post to the unit distribution accounts until the end of the month. At that time the control column totals, as accumulated by the adding registers or totalizers, are posted to the general ledger controlling accounts, and the different items chargeable to each unit account are listed, and the total of each listing posted to the unit account. When this is accomplished, the total postings to all unit accounts of a control division are listed and proved against the control total or column total for that division. This method conforms absolutely to pen practice, and is a very logical procedure in such cases where the writing surface of the mechanical accounting equipment is wide enough

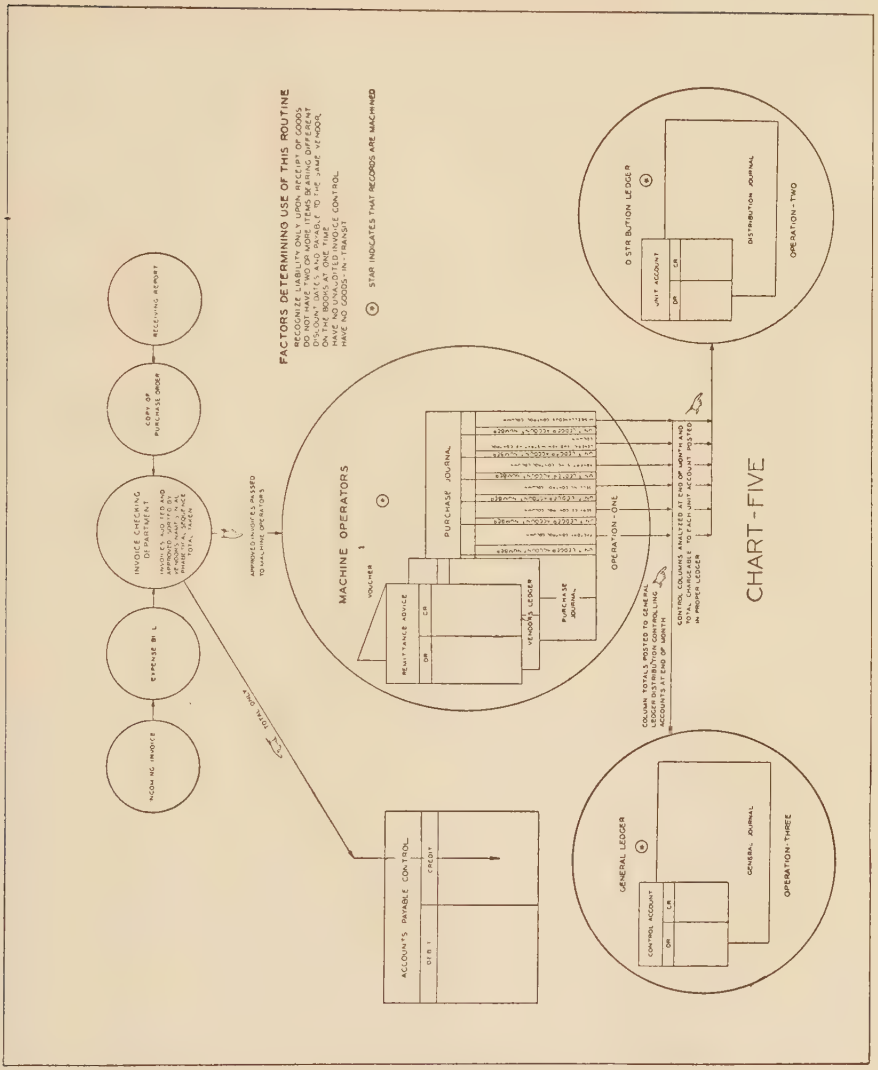

FACTORS DETERMINING USE OF THIS ROUTINE
RECOGNIZE LIABILITY ONLY UPON RECEIPT OF GOODS
DO NOT HAVE TWO OR MORE ITEMS BEARING DIFFERENT DISCOUNT DATES PAYABLE TO THE SAME VENDOR ON THE BOOKS AT ONE TIME
HAVE NO VOUCHERS PAID BEFORE RECEIPT OF GOODS
HAVE NO VOUCHERED INVOICE CONTROL
STAR INDICATES THAT RECORDS ARE MACHINED
RECEIVING REPORT
COPY OF PURCHASE ORDER
INVOICE CHECKING DEPARTMENT
EXPENSE BILL
INCOMING INVOICE
APPROVED INVOICES PASSED TO ACCOUNTING DEPT.
MACHINE OPERATORS
VOUCHER
REMITTANCE ADVICE
PURCHASE JOURNAL
VENDORS LEDGER
OPERATION-ONE
COLUMN TOTALS POSTED TO GENERAL LEDGER CONTROL ACCOUNTS AT END OF MONTH
CONTROL COLUMNS ANALYZED AT END OF MONTH AND TOTAL CHARGEABLE TO EACH UNIT ACCOUNT POSTED IN PROPER LEDGER
DISTRIBUTION LEDGER
UNIT ACCOUNT
DR
CR
DISTRIBUTION JOURNAL
OPERATION-TWO
GENERAL LEDGER
CONTROL ACCOUNT
GENERAL JOURNAL
OPERATION-THREE
ACCOUNTS PAYABLE CONTROL
CREDIT
DEBIT
CHART-FIVE

Figure 27. Accounts Payable Routine Chart—with columnar distribution based on recognition of liability upon receipt of goods and when invoices do not have two or more items bearing different discount dates payable to same vendor

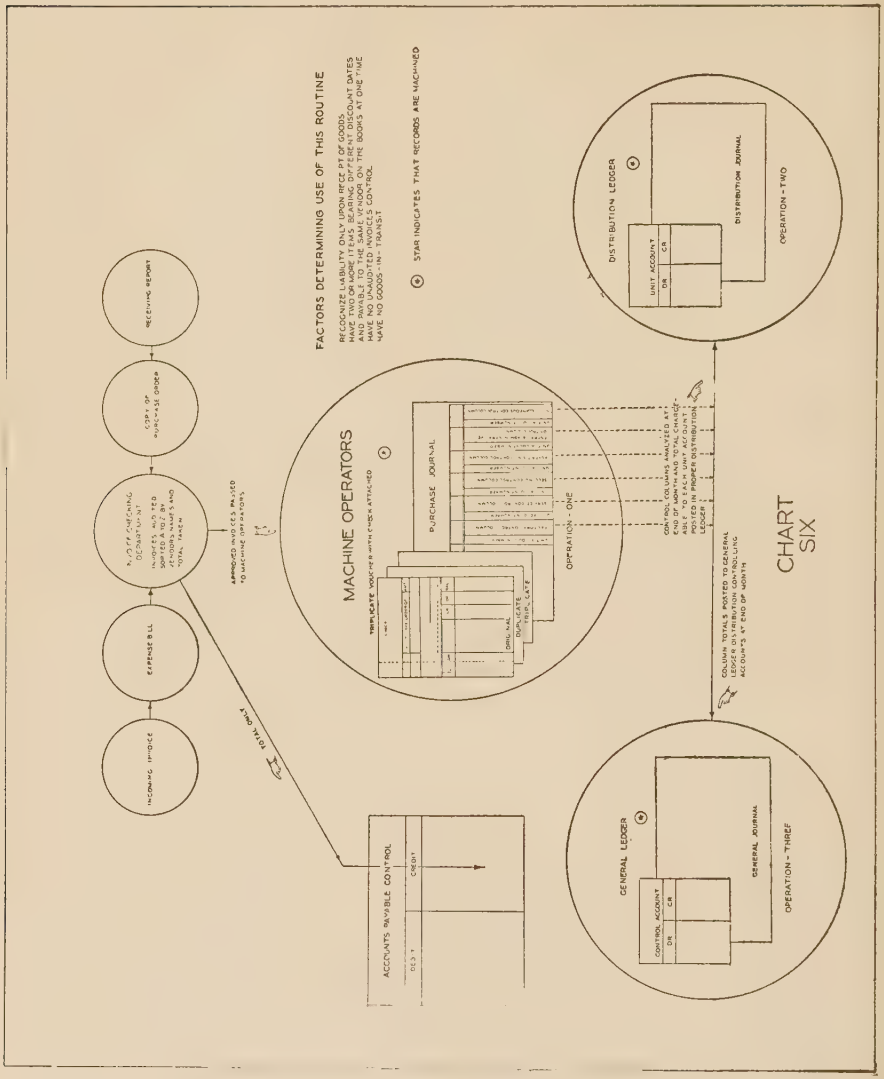


Figure 28. Accounts Payable Routine Chart—with columnar distribution, based on recognition of liability upon receipt of goods and when invoices do not have two or more items bearing different discount dates payable to same vendor

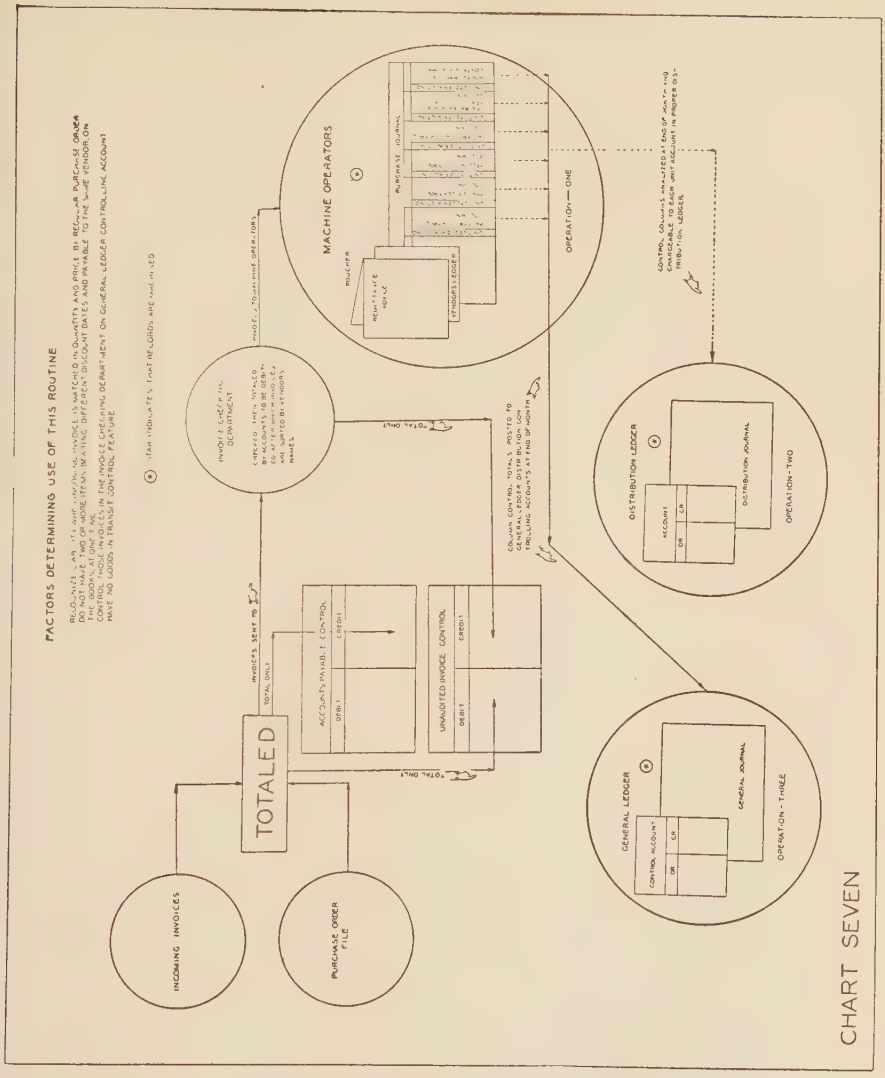


Figure 29. Accounts Payable Routine Chart—with columnar distribution, based on recognition of liability upon receipt of invoice, and where that invoice does not have two or more items bearing discount dates payable to same vendor

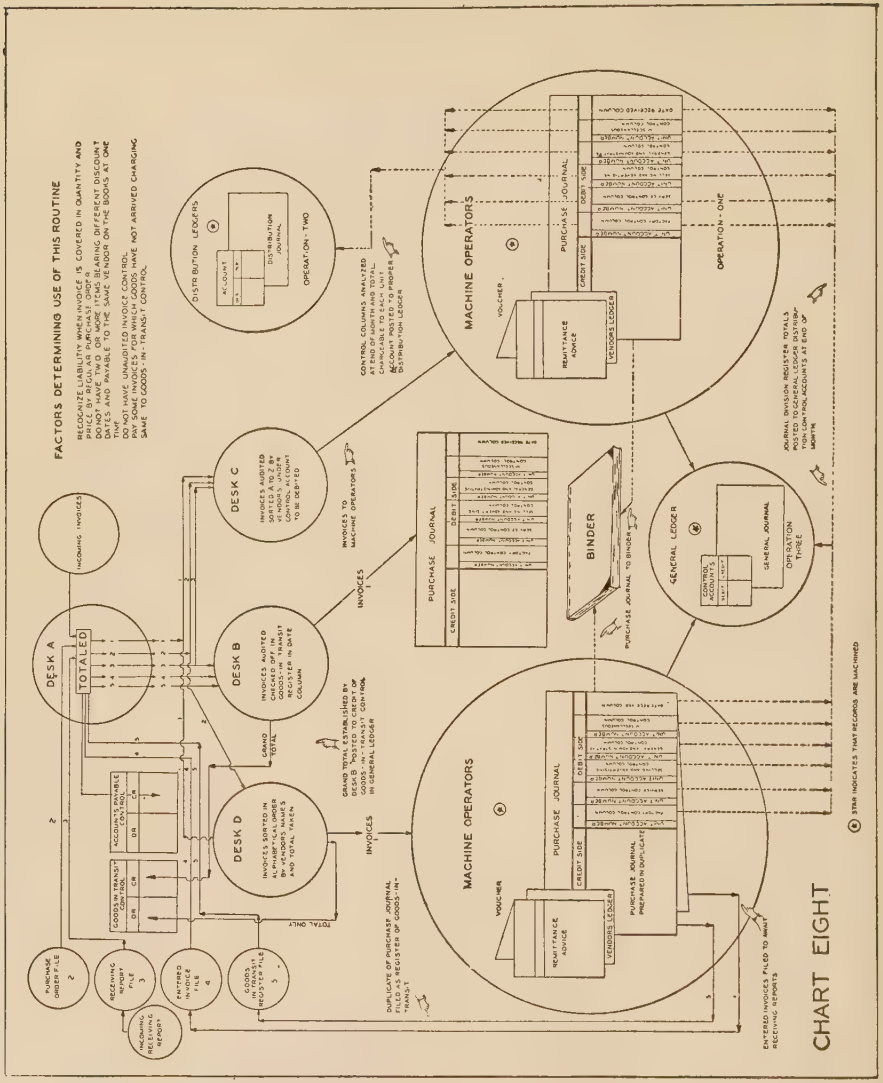

FACTORS DETERMINING USE OF THIS ROUTINE
RECOGNIZE LIABILITY WHEN INVOICE IS COVERED IN QUANTITY AND PRICE AGREES WITH PURCHASE ORDER & RECEIVING REPORT
DO NOT HAVE TWO OR MORE ITEMS BEARING DIFFERENT DISCOUNT DATES AND PAYABLE TO THE SAME VENDOR ON THE BOOKS AT ONE TIME
DO NOT HAVE UNAUDITED INVOICE CONTROL
PAY SOME INVOICES FOR WHICH GOODS HAVE NOT ARRIVED CHARGING SAME TO GOODS-IN-TRANSIT CONTROL
INCOMING INVOICES
DESK A
TOTALED
DESK B
DESK C
DESK D
INVOICES AUDITED CHECKED—GOODS-IN-TRANSIT REGISTER IN DATE COLUMN
INVOICES AUDITED CHECKED—CREDIT TO VENDOR'S UNDER CONTROL ACCOUNT TO BE POSTED
INVOICES SORTED IN ALPHABETICAL ORDER BY VENDORS & AMOUNTS AND TOTAL TAKEN
GRAND TOTAL
TOTAL ONLY
INVOICES
INVOICES TO MACHINE OPERATORS
GRAND TOTAL ESTABLISHED BY CREDIT POSTED TO GOODS-IN-TRANSIT CONTROL IN GENERAL LEDGER
DISTRIBUTION LEDGERS
ACCOUNT
DISTRIBUTION JOURNAL
OPERATION - TWO
CONTROL COLUMNS ANALYZED AT END OF MONTH AND TOTAL CARRIED FORWARD TO ACCOUNT POSTED TO PROPER DISTRIBUTION LEDGER
MACHINE OPERATORS
PURCHASE JOURNAL
DEBIT SIDE
CREDIT SIDE
VOUCHER
REMITTANCE ADVICE
VENDORS LEDGER
OPERATION - ONE
JOURNAL DIVISION REGISTER TOTALS POSTED TO GENERAL LEDGER DISTRIBUTION CONTROL ACCOUNTS AT END OF MONTH
BINDER
PURCHASE JOURNAL TO BINDER
GENERAL LEDGER
CONTROL ACCOUNTS
GENERAL JOURNAL
DISTRIBUTION THREE
ACCOUNTS PAYABLE CONTROL
GOODS IN TRANSIT CONTROL
DR
CR
PURCHASE ORDER FILE 2
RECEIVING REPORT FILE 3
ENTERED INVOICE FILE 4
GOODS IN TRANSIT REGISTER FILE 5
INCOMING RECEIVING REPORT
DUPLICATE OF PURCHASE JOURNAL FOR REGISTER OF GOODS IN TRANSIT
PURCHASE JOURNAL PREPARED IN DUPLICATE
ENTERED INVOICES FILED TO WAIT RECEIVING REPORTS
STAR INDICATES THAT RECORDS ARE MACHINED
CHART EIGHT

Figure 30. Accounts Payable Routine Chart—with columnar distribution, based on recognition of liability upon receipt of invoice and the accounting treatment of goods in transit

to accommodate all the control distribution requirements. Observable experience has proved that the work involved in end-of-month segregation of unit expense items and the posting and proving of them requires only a few hours in small concerns.

The fourth variation concerns the handling of items for which goods have not been received, but where amounts have been distributed to the controlling accounts to be charged at the time of posting to the accounts payable records. A suspense credit to these control accounts is carried in the form of a goods in transit control which is reduced as the goods are actually received. This varies from the unit plan under which items paid for before the receipt of the goods are charged to a suspense account known as goods in transit.

The foregoing principles cover the treatment of every possible condition encountered in systems of accounts payable and distribution. While the routines discussed apply to descriptive writing and adding equipment, we will next illustrate what can be accomplished on non-descriptive writing but multiple adding equipment, such as the flat-printing platen accounting machine, and electric tabulating punched card equipment, as applied to vendors' accounts payable and distribution systems.

Ticket Method of Distribution.—The condition to be borne in mind in the following system is that liability is recognized upon receipt of goods only. The type of equipment used throughout the application is the printing accounting machine equipped with flat-printing platen, which is provided with twenty-six classification totals, a proof total, and two group totals. The totals have a registering and accumulating capacity of one cent less than ten million dollars. The first five rows of the number-printer keys, as will be seen by referring to the illustration in Figure 31, are used to print invoice numbers. The next five rows are used to print vendors' (concerns of whom materials are purchased) alphabetical code and numbers.

The machine issues a ticket, posts to distribution cards, certifies invoices, and prints a continuous record of each registration in the order of its occurrence.

The purchase invoices are first sorted alphabetically according to the vendors' accounts. The vendors' code numbers are then placed on the invoices together with the numbers of the classification into which the items are to be distributed on the machine. By referring to the keyboard arrangement of the machine shown in Figure 31, it will be observed that the vendors are coded by using the alphabet keys, and the next three rows of number keys on the number printer. For example, A 101 would designate an invoice from the Progressive Company.

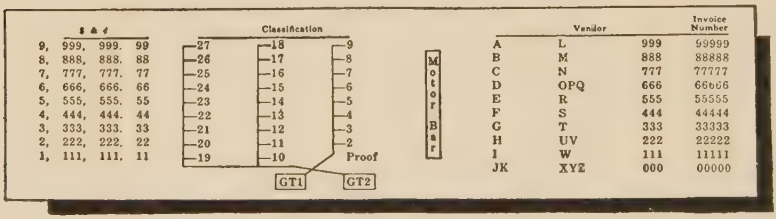


Figure 31. Keyboard Arrangement of Flat-Printing Platen Accounting Machine

A predetermined total is taken of all the invoices before the distribution. The "Proof" key is used for this purpose. The invoices are then run through the machine in the following manner. We will assume that the first invoice was from the Progressive Company, covering castings amounting to $150.00, the invoice number being 12842, the code A 101, and the classification number (15). The code A 101 and the invoice number, 12842, are noted and set up on the number-printer keys, the classification key (15) is pressed, the invoice is inserted face down on the printing table, and the machine operated. By this operation the amount is added on classification total (15), and on group total No. 2. The back of the invoice

is certified with the date, serial number of the registration, code number, invoice number, classification total symbol, and the amount. The same information with the exception of the date is printed on the audit sheet inside of the machine. The "Proof" total is used on this analysis to record all freight items.

When invoices cover special expense items, including manufacturing and commercial expenses of which a further analysis is required, a ticket, illustrated in Figure 32, is issued by the machine. The account number of each expense item is set up on the number-printer keys. These tickets are sorted according to manufacturing and commercial expenses and are distributed accordingly.

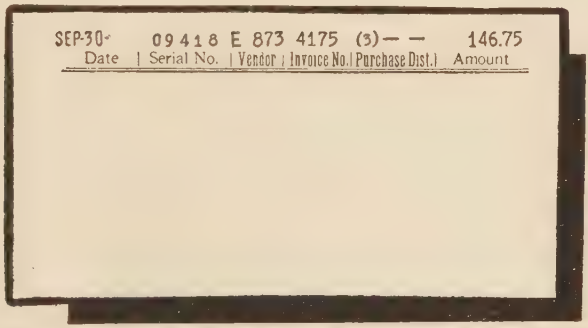
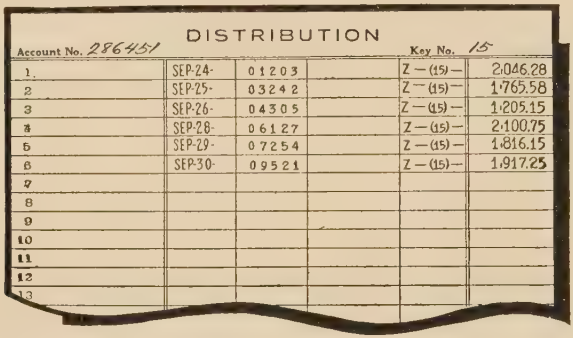


Figure 32. Flat-Printing Platen Accounting Machine Ticket Issued for Special Expense Item

After the analysis of the invoices has been completed, the totals are cleared on distribution cards, an illustration of which appears in Figure 33. There is a separate distribution card for each classification number. These cards are headed at the top with the purchase account number and also by the classification symbol which represents it. A buff-colored card is used for debits and a pink card for credits.

These distribution cards are filed in trays, and a total of the postings is posted to the general ledger. The cards are later permanently filed after they have been filled up. The advantage of predetermining total of invoices, using the "Proof"

total established by the machine for freight items instead of using that "Proof" total to prove each entry made during machine operation, is that the predetermined total is a positive check against amounts established by the group totals developed during machine operation.



DISTRIBUTION

Account No. 286451 Key No. 15

1	SEP-24-	01203		Z—(15)—	2.046.28
2	SEP-25-	03242		Z—(15)—	1.765.58
3	SEP-26-	04305		Z—(15)—	1.205.15
4	SEP-28-	06127		Z—(15)—	2.100.75
5	SEP-29-	07254		Z—(15)—	1.816.15
6	SEP-30-	09521		Z—(15)—	1.917.25
7					
8					
9					
10					
11					
12					
13					

Figure 33. Distribution Card with Entries Produced on Flat-Printing Platen Accounting Machine

Punch Card Method of Distribution.—The following "punch card" system is maintained by a large corporation operating chain stores in principal cities throughout the United States. The merchandise carried retails at prices ranging from five cents to one dollar. The following description of the system will illustrate how the desired results are obtained.

The principle upon which liability is recognized is based on the receipt of goods. Vendors' invoices first go to the store receiving the merchandise, where they are checked for quality and correctness of count. They are then forwarded to the main office, where prices and extensions are verified. Invoices are then passed to accounting machine operators, who prepare remittance statements. A copy of the remittance statement, together with invoices, then goes to a numbering clerk, who serially numbers each invoice and notes the first and last numbers of each group of invoices on the remittance statement accompanying them. Invoices and remittance statements

are then dispatched to key punch operators, who punch a card such as shown in Figure 34.

The field headed "Miscellaneous" is to cover any adjustments that do not properly come under the captions "Discount" and "Freight." The last six columns on the card are for punching complements which are used on credit items. When the key punch operator has punched cards for all invoices, a

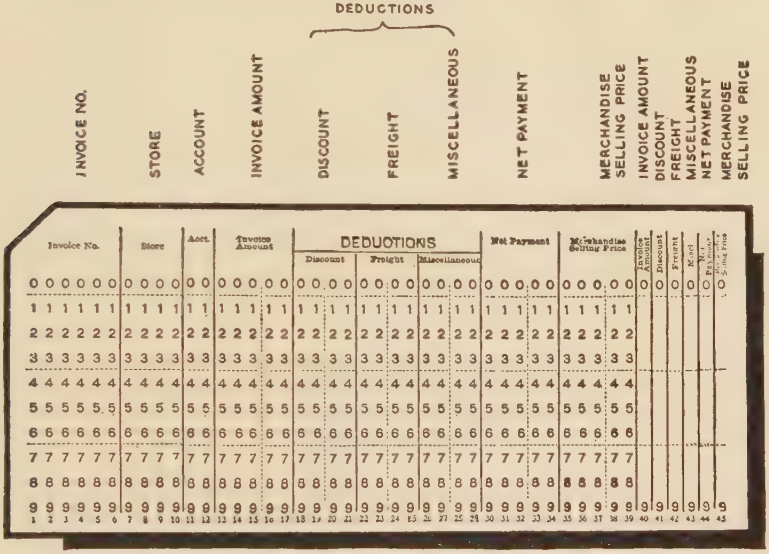


Figure 34. Tabulating Card Showing Particulars of Vendor's Invoice

"stop" card is inserted. As cards are punched they are passed to verifying machine operators for verification. After cards have been verified they are then passed to the tabulating machine operator.

The tabulating machine operator then balances cards against remittance statements on tabulators. As a further check the cards are run through the tabulator a second time, and the total of the day's cards is balanced with the check register, which was written from the remittance statements.

PAGE NO._____ PURCHASE RECORD STORE NO._____

MONTH OF _____ 19__

	Date of Entry	DEBITS							CREDITS							STOCK	
		MERCHANDISE		EXPENSES			EQUIPMENT		MERCHANDISE		EXPENSES			EQUIPMENT		SELLING PRICE	
		Cost	Frgt. & Cart.	Fuel, Water & Light	Rent, Taxes & Ins.	Supplies & Incidentals	Furniture & Fixtures	Permanent Improvements	Cost	Freight, Etc	Fuel, Water & Light	Rent, Taxes & Ins	Supplies & Incidentals	Furniture & Fixtures	Permanent Improvements	DEBIT	CREDIT

Figure 35. Store Purchase Record

A daily tabulation is made by sorting cards to store and account number, and then adding invoice amount, discount, freight, miscellaneous, net payment, and merchandise selling price. The use of complements causes net figures to appear in all counters of the tabulators. The account number gives the proper classification of expense items chargeable to the store. All saleable merchandise is charged into a merchandise account.

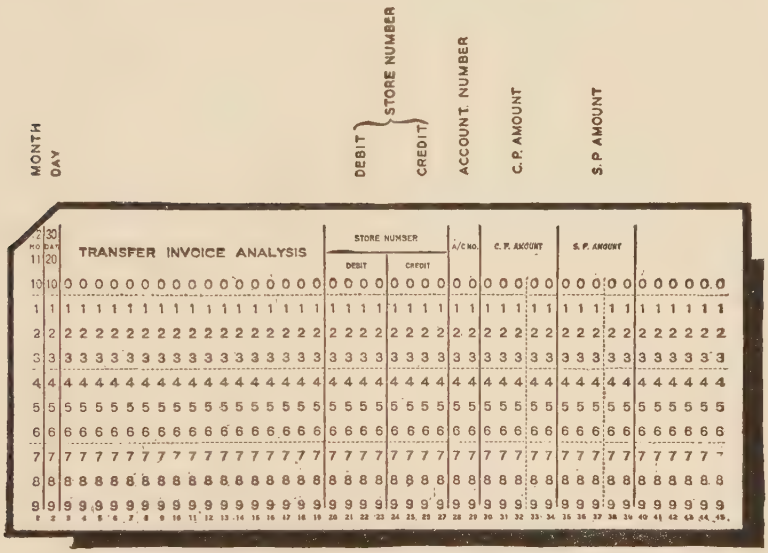


Figure 36. Tabulating Card Showing Transfer Invoice Analysis

A ledger sheet is maintained for each store, and postings are made from the dials on a non-printing tabulator to the form illustrated in Figure 35.

Merchandise at selling price is set up in the general ledger as an inventory charge against the store. This practice of showing inventory in terms of selling price, while unusual except in retail accounting practice, is justified by the fact that it would be impossible to control inventories with such a variety of merchandise at cost. In this connection punched cards afford

an excellent medium for setting up this inventory figure at the time of making original distribution.

When merchandise is transferred from one store to another a card, such as is illustrated in Figure 36, is punched from transfer invoices. The last two fields on this card are "Cost Price Amount" and "Selling Price Amount." Cards are sorted according to account number and stores debits, and a tabulation of cost and selling price is made charging the various stores with the merchandise. A similar tabulation is made to relieve the inventory of the stores credited. This is a monthly tabulation.

Summing up the advantages derived from the foregoing plan we have:

1. A positive balance between the amounts charged to the stores and amounts paid to vendors.
2. Six different classes of information, all pertinent to the final distribution, are secured by merely running through the tabulator once.
3. Clerical effort is reduced.
4. Accuracy and effective control is established.

One of the most decided departures from pen-kept methods is the use of the alphabetical tabulating unit. Heretofore punched card methods were limited by not being able to print alphabetical tabulations such as names and words. Now that such units have been perfected, they are adaptable to many accounting conditions to which they were not applicable heretofore.

System Employing Alphabetical Tabulating Equipment.—The following system represents a typical installation of the alphabetical tabulating unit which punches cards, sorts them, and tabulates the information on forms as though written by a descriptive writing accounting machine.

The principle of the system is based on the recognition of liability upon receipt of goods as follows:

Recording Liability to Vendors and Charge to Distribution Accounts

1. As soon as invoices are audited against the receiving reports and checked for extensions, they are passed to key punch operators.

2. Two cards, similar to the one shown in Figure 37, are

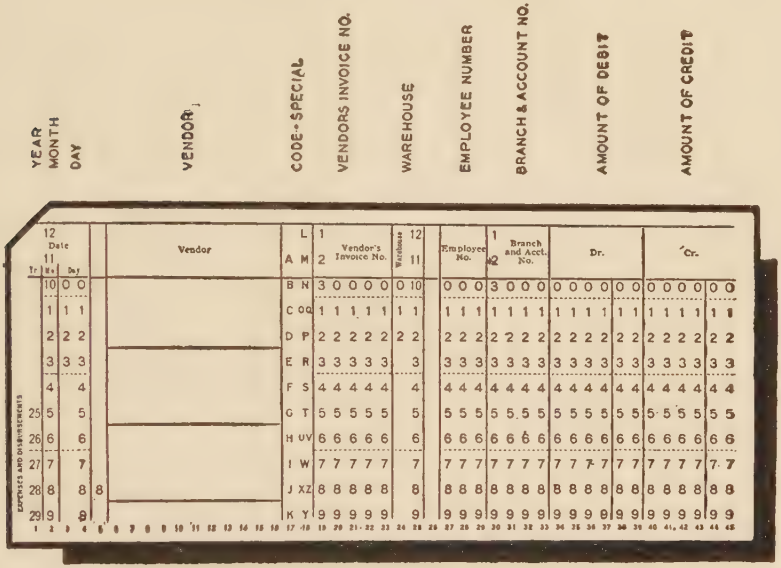


Figure 37. Tabulating Machine Card

punched with the following data (one card to serve as the vendor's account, the other for distribution account).

(a) Date of vendor's invoice or credit memorandum.

(b) Name of vendor.

(c) Vendor's invoice or credit memorandum number, if any.

(d) Employee's number, if purchases are made for and are to be charged to employee's or vendor's credit memorandum covering previous purchases for employees.

(e) Branch and tabulation account number affected.

(f) Amount chargeable to distribution account. (In the

event of split invoices, i.e., invoices bearing two or more items chargeable to different distribution accounts, separate cards are punched for each item.)

(g) Amount applicable to vendor's credit.

(h) All amounts are punched net, i.e., gross amount of invoice less cash discount.

3. Vendors' cards are sorted by vendors' names and tabulated to establish credit to Accounts Payable control account. Tabulating sheets for purchase journal, purchase distribution, cash disbursements, and cash distribution, are shown in Figure 38.

4. Distribution cards are resorted by distribution accounts, and are tabulated to establish debits to material and expense accounts by branches.

5. After tabulation of vendors' cards is completed, cards are resorted according to due date, and filed accordingly. This file represents liability to vendors.

6. After tabulation of distribution, cards which remain in the order of material and expense accounts by branches are filed by accounts and by branches affected. This file constitutes the distribution ledger.

Recording Payments to Vendors, and Other Disbursements

1. Vendors' cards representing invoices due for payment are taken from due date file and are tabulated.

2. This tabulation sheet is passed to the treasurer as his record of invoices due that day, who indicates thereon what invoices are to be paid.

3. Cards are punched for each check drawn, whether for vendor's account or otherwise.

4. Disbursement cards are sorted and tabulated by vendors' names and classes of disbursement other than vendors, such as postage, employees' payroll, etc.

5. Paid vendors' cards are filed in alphabetical sequence according to vendors' names.

6. Disbursement cards for other than vendors are filed by distribution account affected.

It will be noted that the foregoing routine is by no means affected by invoices bearing two or more items, each of which

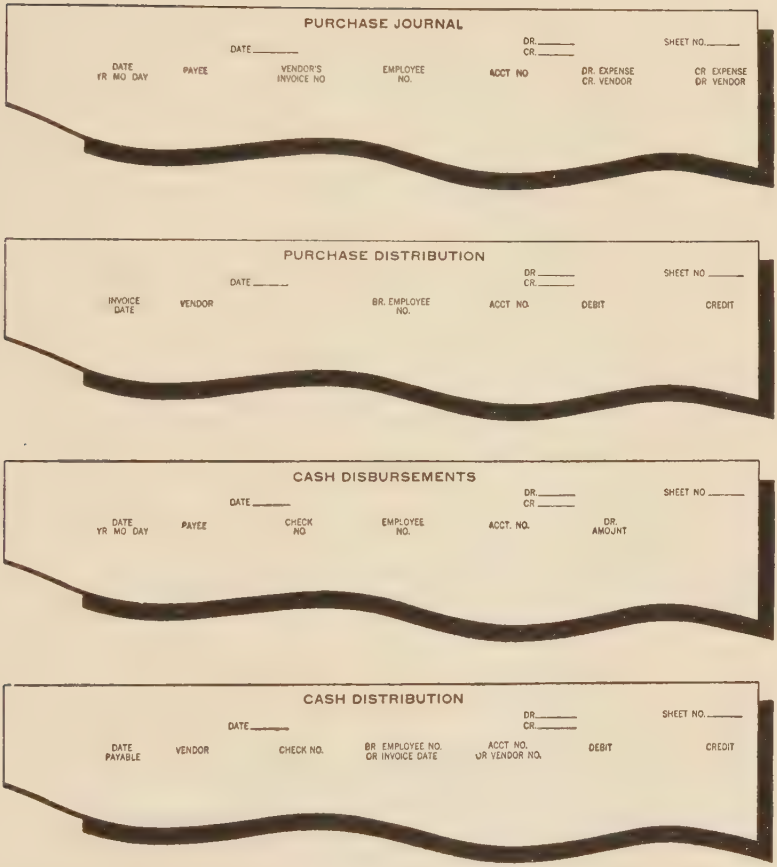


Figure 38. Tabulating Sheets for Purchase Journal, Purchase Distribution, Cash Disbursements, and Cash Distribution

has different discount dates, since a separate vendor's card and distribution card is made for each item appearing on the vendors' invoices.

System Employing Descriptive Writing Accounting Machines.—The following illustrates the manner in which general ledger control accounts are affected by the various machine operations. The principle of this routine is based on the recognition of liability so soon as invoices are received. The type of equipment used is a descriptive writing accounting machine of the flat-writing platen type.

ACCOUNTING CONTROL

Number	Account and Transaction	Debit	Credit
I	Predetermined totals of invoices and allowances.....	No effect on accounts	
II	* Goods in Transit—new invoices and allowances thereon	$ 5,000	$ 150
	Accounts Payable—new invoices.....		5,000
	Accounts Payable—allowances.....	150	
III	† Merchandise—invoices (new and previously entered)..	4,500	
	† Merchandise—allowances.....		150
	† Expense—invoices.....	500	
	* Goods in Transit—all invoices less allowances.....		4,850
IV	Accounts Payable—cash in bank.....	4,850	
	Discount Earned—Accounts Payable.....		150
	Cash in Bank—Accounts Payable.....		4,700
		$15,000	$15,000

Forms used in this routine are illustrated in Figure 39.

* All accounts except "Goods in Transit" are self-explanatory. This account represents, at the end of each day, invoices for which liability has been "set up," but for which the goods have not been received. The total of unchecked invoices on the register of invoices received must agree with the debit balance in the account in the general ledger.

† These General Ledger control accounts are only illustrative. Control over the accounts in the distribution ledger may be maintained by only one account or by enough to form the basis of whatever summaries it may be desired to obtain from the general books.

MACHINE OPERATION I—REGISTERING INVOICES

FORMS USED:

A—Duplicate remittance advice or voucher (check attached).

B—Due date tickler.

C—Register of invoices received. (See Figure 39.)

1. Preparation for Machine Operation

(a) Incoming invoices are sorted in alphabetical order according to vendors' names.

(b) Discount is calculated and deducted.

(c) Invoices are resorted by dates on which they are due for payment.

(d) Totals are taken of gross amounts of invoices and discounts, and the latter deducted from the former; the two totals and result are checked by Operation I, and the first total (gross amounts of invoices) is also checked by Operation II.

2. Machine Operation

(a) The register of invoices received, due date tickler for first discount date, and first duplicate remittance advice or voucher are placed on the writing surface of the machine in the order stated, aligning the last entries on each.

(b) Complete data for all invoices of that date are entered in the voucher or remittance advice section applicable to the vendor each remittance advice represents, inserting due date ticklers for subsequent discount dates as required.

(c) After entering all invoices, and removing the last remittance advice or voucher and due date tickler from the machine, totals shown in the adding registers are simply typed onto the register of invoices received; the machine protecting against inaccurate typing in the following manner. For each unit entry, the computing device or cross-footer automatically adds "Credits" to "Old Balance," subtracts "Deductions" and "Discounts," and indicates "New Balance," which clears from the cross-footer upon typing the figure indicated. During this operation, figures typed in the columns accumulate in the registers over the columns. Furthermore, a "Proof" register is provided in which the old or previous balance is picked up after each entry. The total of the "Proof" register must, after each entry, agree with that in the "Old Balance" register, thus insuring the operator's accuracy in picking up previous balances. This feature [1] applies to all machine operations.

[1] See Chapter II for characteristics of arithmetical machine mechanisms.

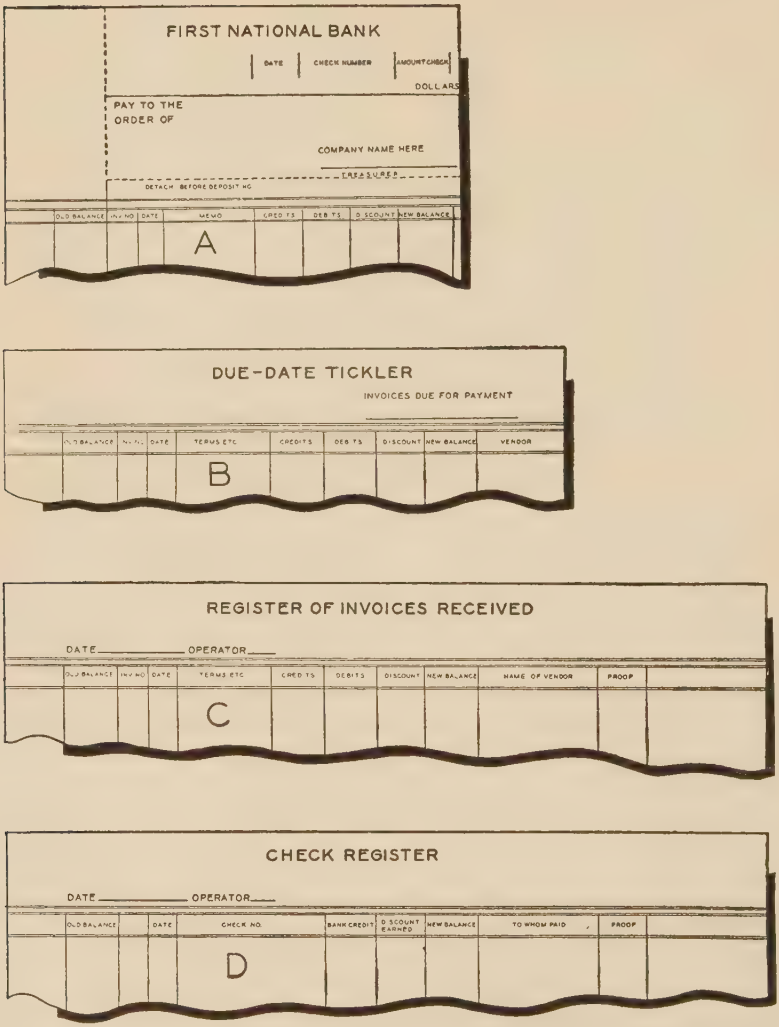
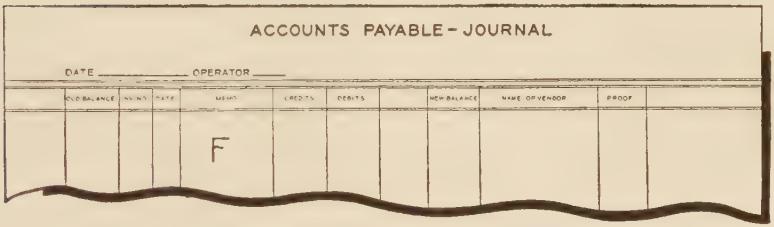
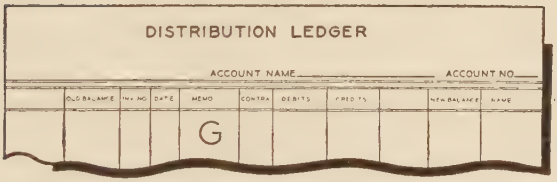
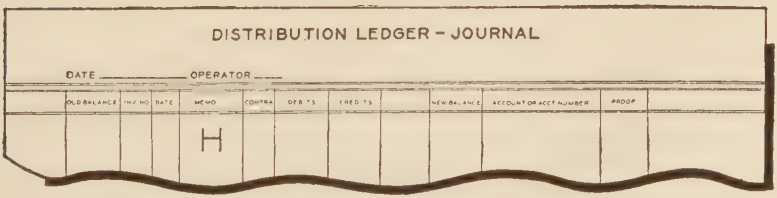


Figure 39. Forms Used in Accounts Payable Routine







Employing Machines Equipped with Flat-Writing Platen

Machine Operation II—Posting Vendors' Ledger

Forms Used:
E—Vendors' ledger.
F—Accounts payable journal. (See Figure 39.)

1. Preparation for Machine Operation

(a) (After Operation I) sort invoices in alphabetical order.
(b) "Stuff" vendors' ledger with invoices.

2. Machine Operation

(a) The accounts payable journal is first placed on the writing surface of the machine, then the first vendors' ledger sheet is inserted.

(b) Invoices are posted in ledger order. If there are any credit memorandums these may be posted with invoices, but it is more practical to post debit memorandums by a separate run.

(c) After posting and removing the last vendors' ledger sheet from the machine, totals shown in the adding registers are simply typed onto the accounts payable journal. The machine protects against inaccurate typing (see explanation under Operation I for further data regarding function of registers).

(d) Start invoices through usual procedure to determine whether prices are correct, goods are received, etc., preparatory to distribution (see Operation III).

Machine Operation III—Posting Distribution Ledger

Forms Used:
G—Distribution ledger.
H—Distribution journal. (See Figure 39.)

1. Preparation for Machine Operation

(a) Check invoices ready for distribution off register of invoices received. (These invoices will, as a rule, be the invoices which have previously passed through Operations I and II, but distribution has been held up pending receipt of goods, checking of prices, etc.)

(b) Totals are taken of gross amount of invoices to be distributed. This is a check on the total to be obtained on the distribution journal.

(c) Sort all invoices in ledger sequence.

(d) "Stuff" distribution ledger with invoices.

2. Machine Operation

(a) The distribution journal is placed on the writing surface of the machine, and then the first distribution ledger sheet affected is inserted.

(b) All merchandise and expense items on invoices are posted in ledger order. If invoices show items to be charged to more than one account, after posting to first account affected, the item posted should be checked and the medium advanced until all items appearing thereon are properly distributed.

(c) Upon completion of posting of all invoices, the last ledger sheet is removed. Adding registers have accumulated totals for all columns affected. These totals are typed on the distribution journal.

(d) From the Distribution Journal, totals should be prepared and charged to distribution control accounts in the general ledger. An illustration of the effect on these control accounts, in a case where only two divisions (merchandise and expense) are maintained, is as follows:

Merchandise, Dr.	$100,000.00	
Expense, Dr.	5,000.00	
To Merchandise, Cr.		$10,000.00
Goods in Transit, Cr. ..		95,000.00

(e) File invoices in "entered" invoice file.

Machine Operation IV—Paying Invoices

Forms Used:

A—Duplicate check (with remittance advice or voucher attached).

E—Vendors' ledger.

D—Check register. (See Figure 39.)

1. Preparation for Machine Operation

(a) The original and duplicate remittance advices or vouchers to be paid are removed from the file with checks attached. These remittance advices or vouchers are in alphabetical order (see Operation I).

(b) Check all invoices to be paid against duplicate remittance advices or vouchers.

(c) Invoices should then be marked paid and a notation made thereon of the number of the check given in payment.

(d) Total amount of the vouchers to be paid should then be taken. This will provide a check on total bank credit.

(e) "Stuff" vendors' ledger with duplicate remittance advices or vouchers.

2. Machine Operation

(a) The check register is placed on the writing surface of the machine, after which the first duplicate check is inserted, folding the latter at the perforation on the right of the "Old Balance" column. This will align the net amount of the check with the "Debit" column of the vendors' ledger and the "Amount of the Check" column of the check register.

(b) The entry is made by first typing the balance of the vendors' ledger account, date, check number, and amount of the check; then by typing "Discount," "New Balance," "Name of Vendor," and "Proof."

(c) After completing the writing and posting for all accounts affected and removing last duplicate check and ledger sheet, adding registers have automatically accumulated totals for all columns affected. These totals are typed on the check register.

(d) The original and duplicate checks, with remittance advices or vouchers attached, are separated. Original is then ready for signature, and duplicate is filed in numerical order by check number.

CHAPTER XII

STOCK AND MATERIAL CONTROL

Stock and Material Control Routines Procedure.—When once the product of a manufacturing enterprise is decided upon, the manufacturing process begins with the purchase of materials. Before processing, the raw materials must be purchased, received, stored, accounted for and issued. It will be seen therefore, that a stores system is a strategic point, and the management which desires speed and economy in production and high quality in the product should lay a proper foundation for these things in a well-organized stores system.

What the factory material requirements are is the first thing the executive in charge of purchasing needs to know. This is determined by the nature of the product, and the product itself is determined ultimately by the wants of the consuming public, which wants are transmitted to the factory in the form of orders.

The materials that go into the manufacture of these orders are usually specified by a designing or engineering department if for a standard product; or, to a certain extent, by the customer if for a special product. Where materials are standard, the designing or engineering department usually determines and selects them in consultation with the purchasing department, whose duty it is to obtain the standard materials in the best market, and at the lowest prices possible. And, of course, where the customer specifies, the purchasing department again has discretion as to the quality only in so far as suggestions from that department may be approved by the customer.

In a thoroughly well-organized plant, the executive in charge of purchasing should buy on precise specifications drawn up

and delivered to him by the designing or engineering department. It is not the function of the executive in charge of purchasing to say how much shall be purchased. If the material is special, to be used only on a special order, the amount called for by that order is the determining factor. If the material is one to be carried in stock permanently, the amount to be carried is a matter to be settled by the requirements of the business.

If a perpetual inventory of each item in stock is maintained, it takes only a very short time to decide what is the safe minimum of stock to be kept on hand. This depends on the rate at which the material is consumed, and the length of time it requires to obtain delivery on an order from the source of supply. When the balance of material on hand falls to the minimum, the purchasing department should be notified to reorder for replenishment. Such notifications may be placed on a requisition designed for use on straight-writing or automatic feed machines.

The quantity that shall be reordered on this requisition depends not alone on the price at which the material can be obtained, but also on the amount of capital which the firm is willing to tie up in such materials and on the space available for storage. It is the pursuit of such methods that is largely responsible for the great savings that can be effected through accounting for the control of materials. The purchasing department has nothing to do with either of the latter questions. One is determined by the policy of the financial manager of the concern; the other by the actual space physically available. It is not meant by this that in the case where staple material is used in large quantities the market price of which fluctuates seasonally or at irregular intervals, the executive in charge of purchasing is not to use his judgment at least to some extent as to the quantities which should be purchased at given prices.

If purchasing policies are to be based on a foundation of fact, it is necessary that the following should be considered:

Demand of Materials. If the monthly requirements of the production department are seasonal in character, the condition should be determined for the various months of the year so that possible shortages on the one hand, or excess stock on the other, may be avoided.

Sources. Where several markets offer the required material each should be analyzed and those offering the greatest advantages selected and listed for future reference.

Delivery. Consideration of the time for suppliers to ship, plus time in transit should be given. Under ordinary circumstances the minimum and maximum time required for delivery should be ascertained, making allowances for any abnormal present conditions. The recording of these data is very important.

Quantity Factors. Prices, discounts, and trade considerations on various quantity shipments should be examined to determine the most equitable and economical unit in which purchases should be made.

Shipment Considerations. The most satisfactory channel for delivery should be carefully determined, i.e., rail or water shipments, car loads, broken lots, etc.

Minimum Stock. When determining the minimum stock as a matter of protection for the production department, a careful study should be made of monthly requirements, sources, time of delivery, transportation, quantity, and shipment factors. In determining this figure allowances should be made to cover the cases which are most liable to arise. One of the most important factors that enters into the determination of minimum stock may be illustrated in the fact that where delivery ordinarily requires one month, for instance, but has in many cases required six weeks, it is reasonable to allow in such cases a minimum stock to cover a requirement of six weeks.

Maximum Stock. When determining the limit quantity for the stock of any individual item, it is necessary to analyze the quantity price, shipping factors, warehouse space available, and financing necessary to carry a relatively large supply of materials. It should be remembered that since fundamental conditions governing material prices cause their general averages to follow broad trends which result in rather extreme fluctuations over a period of months and years, care should be taken in stocks, the price of which evidences a downward trend, as an oversupply of such stocks will result in an entirely unnecessary inventory loss. On the other hand, if the material that is used is rising in price, such stock should be carried at the maximum limit as a protection against price increases, a policy that leads to a greater and entirely legitimate profit.

Relation of Purchasing Department to Other Departments.—In a properly operated plant, the purchasing department stands in certain relations to other important departments. The purchasing department should, for instance, keep the manufacturing department informed in regard to materials and quantities ordered, and the probable dates on which they will be delivered. Such information is extremely necessary to enable the manufacturing department to schedule its production in advance. The purchasing department especially should notify any requisitioner when any part of the requisition has been declined. This lack of information has caused many departments of a manufacturing plant to wait needlessly for material they have ordered and supposed was coming through, only to learn weeks or months after that the purchasing department had not placed the order.

When consideration is given to the fact that materials are money, it is somewhat difficult to understand why capital in the form of cash only should be so carefully protected, its receipt and disbursement safeguarded, and its custodians held to a strict accounting, while when capital is converted into

materials, there is a tendency to become lax, to lose sight of the value of the investment, to tolerate practices that are wasteful, inefficient, and needlessly expensive.

When material is purchased far in excess of production requirements; when material becomes obsolete before it is even processed; when production lags for the lack of material or is clogged by the uneven flow of material through the various processes of manufacture; when a careful check of material is not provided; when material is not protected or kept accessible for use; when operators help themselves without authorized requisitions; and material is consumed without any record made for cost purposes, there is something radically at fault with the methods of a business where such conditions exist.

A practical system for effective material control can be properly designed and installed. There are many plans in use, and the average firm should support and maintain a system that gives effective assistance to production rather than to hamper production through not maintaining proper accounting control over stores.

Advantages of a Material Control System.—In the summary given below of advantages of a material control system, no particular significance is attached to the order in which such advantages are stated, because they are all important. The existing conditions of the individual business should be carefully studied if the paramount object to be gained through such a study is to be realized.

1. The first essential of a stores system should be that of aiding in keeping the investment in materials and supplies to a minimum consistent with efficient factory operation.

2. It should be borne in mind that consumption of material fluctuates with production, and must be regulated effectively.

3. The supply of specific materials on hand is largely regulated by conditions of purchase, production, and demand, and as these conditions change, so should the level of supply.

4. When goods are scarce and deliveries uncertain, a reserve of

material in larger proportions is more essential than when goods are plentiful and deliveries dependable; and when demand falls below actual or planned production, future commitments for material should be curtailed.

5. By adopting the policy of simply ceasing to purchase, a general reduction of materials on hand can be effected in a large degree, but it must be remembered that there is attached to this method the risk of holding up production due to a lack of necessary materials brought about by a non-replenishment policy.

6. The stores control system should readily give the supply of specific materials on hand and establish complete records of their consumption, so that necessary adjustments may be made where the supply is top-heavy or the reserve unnecessarily large.

7. The stores control system should serve as an aid in maintaining a minimum investment in material, and should be made to serve as a guide for the selection of stock so that there will not be a needless range of variety or a surplus of stock.

8. Lists detailing the standard sizes and varieties of material should be conveniently issued as bills of material to all manufacturing departments concerned, or a material catalogue may be prepared in which each size and variety selected as a standard should be detailed and given a separate stock number.

9. The requirements of the manufacturing departments should be restricted as far as practicable to the sizes and varieties of materials carried. Care should be given the selection of odd sizes and kinds, and this selection should not be left to the caprice of the individual but should be based on sound manufacturing practice. An effective and efficient material system will tend to entirely eliminate distinctions that are not differences, and serve as an aid in reducing the inventory to a minimum.

10. The production requirements of an adequate stores control system should enable men and machines to be supplied with material in the manner, time, and in the amount required.

11. The investment in material should be kept low, but not so low as to interfere with production. It must be remembered that machines are not to remain idle because of a lack of required material. Where there are numerous parts entering into production, the lack of stock of any one part is sufficient to check

operations and to throw the entire production program out of balance. Extreme care should be taken to see that material and parts are conveyed to production departments and at the time desired.

12. An unwarranted accumulation of material in the course of production tends to interrupt the flow of production. The movement of materials to men and machines in an unscientific manner is not generally recognized, but an enterprise may be impoverished by such a condition as an individual suffering from weakened blood circulation.

13. Since economy of investment in materials, particularly of parts, cannot be determined on a strictly interest charge basis, there is something more important to consider, namely, the most economical use of production facilities. A ninety-day supply of a specific part may be sufficient enough level to meet the usual demand, but a six months' to one year's supply may be fabricated far more cheaply, and permit of greater quantity production, depending of course on existing conditions. Production orders should be put into work in adequate lots. In short runs of material, the setting-up time is invariably disproportionate when compared to the time of actual operation. Long runs are closely related with the subject of the standardization of parts and products. If the existing differences are not fundamental, the substitution of one part to serve where three formerly were required is one of the economies longer runs will effect.

14. A system of stores control functioning effectively should facilitate the full and free operation of the plant under even pressure. The combining of a frequent scrutiny of material, a careful determination of material requirements upon broad considerations, a tenacious tracing of purchases, and a skillful routing of material through manufacturing departments, are functions not primarily of the stores department, but they should, nevertheless, be considered essential to its proper functioning.

15. The functions of checking incoming material for amounts, quality, and condition, placing material where it can be readily found and be accessible for use, protecting the material against climatic conditions, and if fragile, against breakage, adopting the proper precautions against pilferage, and safeguarding the issu-

ance of material to the factory, are extremely important. The detection of breakage, waste, and pilferage has been made difficult in many cases through lack of a proper control of material withdrawals.

16. The integral part of the stores control system should be a perpetual inventory, frequently checked by actual tests of quantities on hand, which in some lines of businesses make unnecessary the expensive and burdensome annual physical inventory, with its general disorganization and plant shut-down. How this is accomplished will be described later.

17. The essential part of the system should be the accurate accounting for material, and should afford a comparison of actual material receipts with purchase requisitions, a record of authorized issues of material to the factory, a comparison of actual issues with estimates of quantities previously determined, as well as information making possible an accurate allocation of the cost of material to the proper departments, jobs, or processes.

18. Storage space can be economized through a well-planned stores control system. In businesses that are growing and where available room is limited, this phase of the system is a very important one.

19. Storage economy centers in the safe and orderly custody of goods, and this requires knowledge of their identity, location, safe housing, orderly arrangement, etc.

20. Material should never be issued from stores without a properly signed requisition. The guiding principle should be a control of the quantities of material to be issued upon a given job or to a particular department so as to guard against withdrawals in excess of requirements to cover spoilage.

Routine Requirements for Controlling Material.—The typical steps that cover the routine of controlling materials are as follows:

1. The executive responsible for the ordering of material prepares a regular purchase requisition which is dispatched to the purchasing department.

2. The purchasing department, upon receipt of the purchase

requisition, prepares a purchase order, a copy of which is dispatched to the stores department for filing in the receiving room.

3. When material arrives, it is checked, unloaded, opened, counted, inspected, recorded against proper purchase order, removed to the proper stores location and receiving bin location, after which material ledger entries are made.

4. When material is issued to the various departments on presentation of authorized requisitions, the proper bin tag deductions are made, and issues of material are sent to the cost department for purposes of cost allocation.

5. Material should be scrutinized from time to time and checked with stores records, and shortages should be reported to the purchasing department. By the application of this principle, slow moving items may be eliminated automatically.

Stores and Stock Record Accounting Defined.—Having described the factors entering into effective material and stock control systems, we will now turn our attention to the accounting aspect of such systems. Stores or stock record accounting may be defined as that branch of accounting which deals with the keeping of accurate records of quantities and quantity values of materials or merchandise. Whether such records are for materials that are to be manufactured or are to be sold, they are essentially inventory accounts and should be taken into the general books of the concern as assets. Stores or stock records may be quantity records only, or they may be records showing book quantities and values. It matters not which of the above is used; the record must be possible of interpretation on a value basis in order to be carried into, or proved against controlling accounts in the general books or on operating statements.

Stores accounts represent property rights or values. They are maintained because of their accounting value, and because of their working value in the management of a business. The accounting value of stores records is equivalent in importance

to the record of the assets of the concern. From the standpoint of preparing the final financial statement, the detail listing such as a stores record shows of all materials and articles owned by a concern, is of the same definite accounting importance as a detail listing of the concern's buildings and other properties.

The operating value of stores records is developed in the actual operation of the plant. From stores records, planning departments plan production and order necessary raw materials for carrying on that production. By means of such records the purchasing department is able to follow up receipts against given purchase orders and check the accuracy of invoices from vendors. The records of raw stores may be regarded as one of the principal elements of a cost system. Charges to inventory for material received from vendors should check against the actual credits to those vendors. Reservations on the stores records for production afford a means for verification of production plans. Disbursements from stores should be recorded and made to form a controlling figure against which the charge to costs for material used must balance. At the close of an accounting period, the inventory of "stock on hand" may be established, and by interpreting this inventory in value, it serves as a fundamental aid in determining operating profits or losses. Without a system of stores or stock records many businesses operate under the dangerous practice of depending upon statements of profit and loss that are based on a guess, until such time as a physical inventory actually establishes the truth of such profit or loss as the case may be.

Systems of Stores Accounting

There are many systems of stores accounting methods, each offering a variety of information desired, and each subject to a different method of handling; each differing from the others in object and form, and all adaptable to mechanical accounting equipment. The most important of these are:

1. Raw stores, quantity record.
2. Raw stores, quantity, and value records.
3. In process stores.
4. Semi-finished stores.
5. Finished stores, completed product.
6. Retail buying and stock control.

Questions that May Be Asked in System Surveys.—To present all the information necessary for the examination, design, and installation of a complete stock and material control accounting system is impossible due to space allotment. The following list of questions is intended only as an aid for the examiner in suggesting improvements in existing accounting methods, particularly with regard to the handling of detail with the use of the mechanical accounting equipment dealt with in this book.

Relating to Purchasing, Receiving, Recording, Storing, and Issuing of Materials:

1. Ascertain whether the accounts payable division furnishes distribution of expense and material purchased by cost units affected.
   (a) If not, what is the method of obtaining charges? (For further information, refer to instructions on survey for accounts payable and distribution routine, Chapter XI.)
2. Ascertain whether all incoming material is received through a receiving stores department.
3. Are requisitions for purchases of materials prepared?
   (a) By whom and in what departments?
   (b) How many copies of such requisitions are made?
   (c) Average number of items per requisition.
   (d) How many requisitions are written per day?
   (e) Written by hand?
   (f) If by machine, how many machines are used? Ascertain make and type of equipment.
4. If requisitions for purchases are not used, how is purchasing department advised of material needed?

5. Are stores records kept in cost division?
   (a) Are they kept as to quantity only?
   (b) Quantity and value?
6. If stores records are kept in stores department, are the detail accounts duplicated in the cost division?
7. Are one or more control accounts maintained over the detail stores accounts?
   (a) What general divisions of material do such control accounts represent?
      (1) Purchases, raw material.
      (2) Purchases, semi-finished parts.
      (3) Purchases, finished parts.
      (4) Purchases, supplies.
      (5) Material in process.
      (6) Manufactured parts.
      (7) Manufactured assemblies.
      (8) Manufactured completed product.
8. If a stores record is not kept in cost division, what records are maintained as to quantities, prices, etc.?
9. Are there local departmental stockrooms in addition to a main stockroom?
   (a) If so, are control stores records kept?
   (b) If not, determine system in use.
10. Ascertain type of stores records in use, and obtain full information as to whether records are kept showing quantity, values, and unit value of:
   (a) Actual balance.
   (b) Balance on order.
   (c) Amount in transit.
   (d) Amount available, i.e., actual, plus on order, minus apportioned.
   (e) Amount apportioned but not issued.
   (f) Report of goods on order.
   (g) Report of material received.
   (h) Report of shipments.
   (i) Report of material issued.
   (j) Report of apportionments.
   (k) Report of stock and material shortages.
   (l) Report of spoiled and scrapped material.

11. Obtain full information and description of daily or other reports required as to material ordered by, received by, and issued from stockrooms, etc.
    (a) Name of report.
    (b) By whom made.
    (c) Period covered by report.
    (d) Number of copies.
    (e) Average number of items on report.
    (f) Written by hand?
    (g) If by machine, how many machines are used, what are the makes and types of equipment?
12. Ascertain the organization relation and location of cost, purchasing and receiving departments to stores department and stores records.
13. Ascertain how requisitions for stores required for manufacturing operations originate.
14. How are withdrawals from storeroom requisitioned?
    (a) Who authorizes the issuances of material from stores?
    (b) When and by whom are requisitions prepared?
    (c) If not used, would it prove desirable to use individual requisitions?
15. Obtain full information regarding:
    (a) The detail connected with returning unsatisfactory material to vendor.
    (b) Return to storeroom of unused and imperfect material, including checking and crediting.
    (c) The basis for stores classification.
        (1) Number?
        (2) Letter?
        (3) Description?
    (d) The form in which present inventory records are kept.
    (e) The number of stores accounts maintained in each of the following groups.
        (1) Purchases, raw material.
        (2) Purchases, semi-finished parts.
        (3) Purchases, finished parts.
        (4) Purchases, supplies.
        (5) Manufactured parts.

(6) Manufactured assemblies.
(7) Manufactured completed product.

(f) The number of media handled per day in each of the above classes.
(1) Receipts.
(2) Withdrawals.
(3) Returns.
(4) Purchase orders.
(5) Apportionments.

(g) Are any postings or adjustments made on stores records on verbal authority?

16. Ascertain number of people employed in material control routine in the stores department and in the cost division.
(a) Number male or female.
(b) Total number of hours per day devoted by each.
(c) Total salaries paid.

17. Obtain copies of all forms and records used with complete entries.

18. Note any additional information that may prove helpful.

Method of Obtaining Material Costs:

1. Is productive material requisitioned from storeroom?
(a) If not, how is material cost determined?
(b) How apportioned?

2. Determine following information regarding material requisitions.
(a) Written by hand?
(b) If by machine, ascertain make and type of equipment used.
(c) How many copies are made?
(d) How are they distributed?
(e) Who prices requisitions?
(f) When are they priced?
(g) Who extends requisitions?
(h) When are they extended?

3. Is basis for costing material an average price?
(a) If so, when is average value adjusted?
(b) If not, what is the basis for pricing?

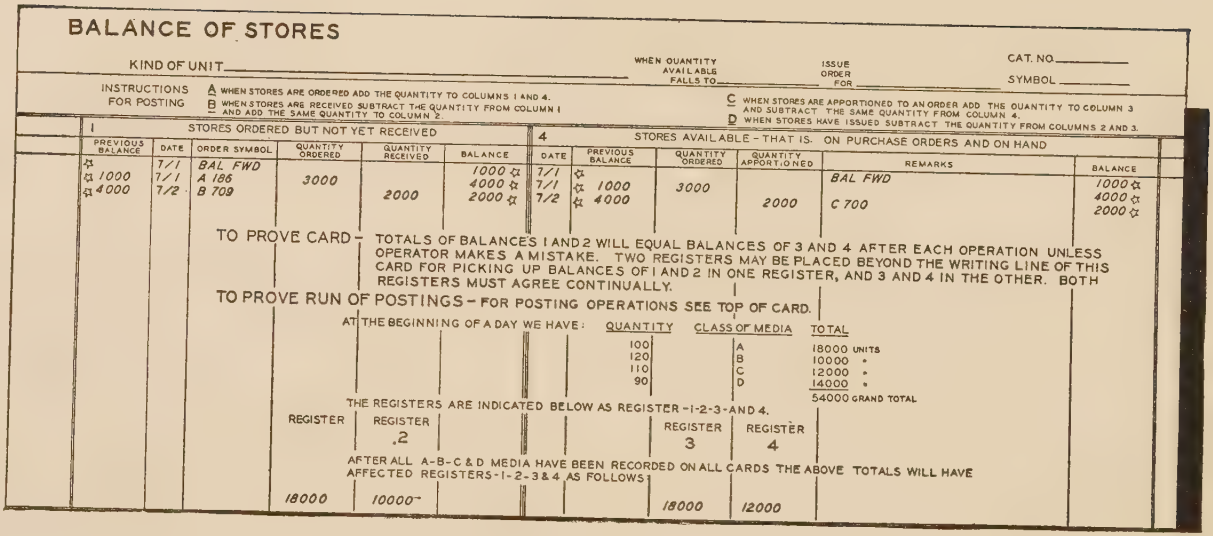
4. Is excess material on jobs returned to stockroom?
(a) If not, how handled in costs?

5. Is total of material charged to costs checked with total value of stores issue?
   (a) If so, when and how often is this done?
   (b) By whom and how?
6. Are material accounts charged with stockroom, warehouse or other expense?
   (a) If so, how often?
   (b) On what basis?
7. Are supplies or expense material requisitioned?
   (a) If not, how is their cost determined?
   (b) How apportioned?
8. Ascertain whether each foreman or department head is provided with a record of expense material used.
   (a) If so, how often?
   (b) How many copies are made?
   (c) Written by hand?
   (d) If by machine, ascertain make and type of equipment used.

Relating to Production:

1. Ascertain whether the cost division receives copies of orders on operating departments for commencement of production.
   (a) If not, obtain procedure as to how cost division receives notice to open new cost units?
2. Ascertain whether the cost division receives copies of work orders issued by departments on each other.
   (a) If not, obtain procedure as to how these orders are controlled and cost recorded.
3. How does cost division obtain its record of delivery of work in process to stockrooms?
4. How does cost division obtain its record of work in process delivered from one department or process to the next?
5. How often are actual physical inventories of work in process taken?
6. How often is actual balance of work in process in each department checked up with cost division records?
7. How does cost division obtain its record of finished work delivered to packing or shipping department?

Raw Stores Quantity Record.—The raw stores quantity record may be regarded as a vital cost and inventory record.



BALANCE OF STORES

KIND OF UNIT _____ WHEN QUANTITY AVAILABLE FALLS TO _____ ISSUE ORDER FOR _____ CAT. NO. _____ SYMBOL _____

INSTRUCTIONS FOR POSTING
A WHEN STORES ARE ORDERED ADD THE QUANTITY TO COLUMNS 1 AND 4.
B WHEN STORES ARE RECEIVED SUBTRACT THE QUANTITY FROM COLUMN 1 AND ADD THE SAME QUANTITY TO COLUMN 2.
C WHEN STORES ARE APPORTIONED TO AN ORDER ADD THE QUANTITY TO COLUMN 3 AND SUBTRACT THE SAME QUANTITY FROM COLUMN 4.
D WHEN STORES HAVE ISSUED SUBTRACT THE QUANTITY FROM COLUMNS 2 AND 3.

1 STORES ORDERED BUT NOT YET RECEIVED						4 STORES AVAILABLE – THAT IS. ON PURCHASE ORDERS AND ON HAND					
PREVIOUS BALANCE	DATE	ORDER SYMBOL	QUANTITY ORDERED	QUANTITY RECEIVED	BALANCE	DATE	PREVIOUS BALANCE	QUANTITY ORDERED	QUANTITY APPORTIONED	REMARKS	BALANCE
☆	7/1	BAL FWD			1000 ☆	7/1	☆			BAL FWD	1000 ☆
☆ 1000	7/1	A 186	3000		4000 ☆	7/1	☆ 1000	3000			4000 ☆
☆ 4000	7/2	B 709		2000	2000 ☆	7/2	☆ 4000		2000	C 700	2000 ☆

TO PROVE CARD – TOTALS OF BALANCES 1 AND 2 WILL EQUAL BALANCES OF 3 AND 4 AFTER EACH OPERATION UNLESS OPERATOR MAKES A MISTAKE. TWO REGISTERS MAY BE PLACED BEYOND THE WRITING LINE OF THIS CARD FOR PICKING UP BALANCES OF 1 AND 2 IN ONE REGISTER, AND 3 AND 4 IN THE OTHER. BOTH REGISTERS MUST AGREE CONTINUALLY.

TO PROVE RUN OF POSTINGS – FOR POSTING OPERATIONS SEE TOP OF CARD.

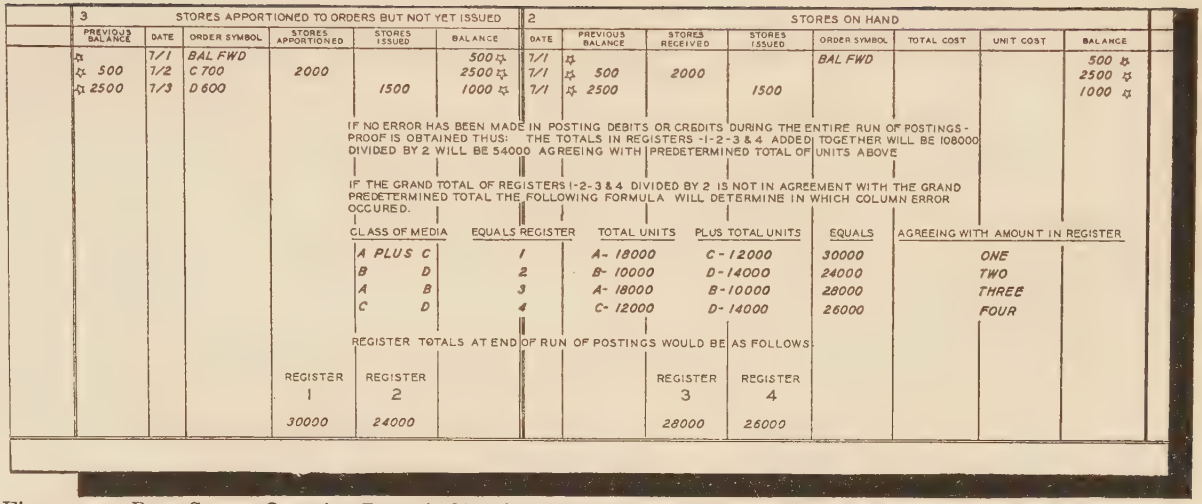
AT THE BEGINNING OF A DAY WE HAVE:

QUANTITY	CLASS OF MEDIA	TOTAL
100	A	18000 UNITS
120	B	10000 "
110	C	12000 "
90	D	14000 "
		54000 GRAND TOTAL

THE REGISTERS ARE INDICATED BELOW AS REGISTER-1-2-3-AND 4.

REGISTER	REGISTER .2	REGISTER 3	REGISTER 4
18000	10000	18000	12000

AFTER ALL A-B-C & D MEDIA HAVE BEEN RECORDED ON ALL CARDS THE ABOVE TOTALS WILL HAVE AFFECTED REGISTERS-1-2-3 & 4 AS FOLLOWS:



3 STORES APPORTIONED TO ORDERS BUT NOT YET ISSUED

PREVIOUS BALANCE	DATE	ORDER SYMBOL	STORES APPORTIONED	STORES ISSUED	BALANCE
☆	7/1	BAL FWD			500 ☆
☆ 500	7/2	C 700	2000		2500 ☆
☆ 2500	7/3	D 600		1500	1000 ☆

2 STORES ON HAND

DATE	PREVIOUS BALANCE	STORES RECEIVED	STORES ISSUED	ORDER SYMBOL	TOTAL COST	UNIT COST	BALANCE
7/1	☆			BAL FWD			500 ☆
7/1	☆ 500	2000					2500 ☆
7/1	☆ 2500		1500				1000 ☆

IF NO ERROR HAS BEEN MADE IN POSTING DEBITS OR CREDITS DURING THE ENTIRE RUN OF POSTINGS - PROOF IS OBTAINED THUS: THE TOTALS IN REGISTERS -1-2-3 & 4 ADDED TOGETHER WILL BE 108000 DIVIDED BY 2 WILL BE 54000 AGREEING WITH PREDETERMINED TOTAL OF UNITS ABOVE

IF THE GRAND TOTAL OF REGISTERS 1-2-3 & 4 DIVIDED BY 2 IS NOT IN AGREEMENT WITH THE GRAND PREDETERMINED TOTAL THE FOLLOWING FORMULA WILL DETERMINE IN WHICH COLUMN ERROR OCCURED.

CLASS OF MEDIA	EQUALS REGISTER	TOTAL UNITS	PLUS TOTAL UNITS	EQUALS	AGREEING WITH AMOUNT IN REGISTER
A PLUS C	1	A- 18000	C - 12000	30000	ONE
B D	2	B- 10000	D - 14000	24000	TWO
A B	3	A- 18000	B - 10000	28000	THREE
C D	4	C- 12000	D - 14000	26000	FOUR

REGISTER TOTALS AT END OF RUN OF POSTINGS WOULD BE AS FOLLOWS:

REGISTER 1	REGISTER 2	REGISTER 3	REGISTER 4
30000	24000	28000	26000

Figure 40. Raw Stores Quantity Record, Showing Four Balances, Two of Which Are Affected by Each Entry. Action and Proof of Record Are Self-Explanatory

To be of greatest value, it should show balance on order, balance on hand, and balance available. The raw stores record should give all the information that may be required concerning a given stores account, in order that it may reach its highest efficiency. It is generally known, without need of emphasizing the fact, that such a record should portray its balance of raw stores on hand. Moreover, the management should not be asked to replenish stock after such raw stores are physically low if additional stock has already been ordered. Therefore, it is desirable that the record show the balance on order.

One of the most complete records, so far as information contained thereon is concerned, that has ever been developed for use on mechanical accounting equipment, is that shown in Figure 40. This record affords such information as stores on order but not yet received; stores available, i.e., stores purchased and on hand; stores apportioned to orders but not yet issued; and physical balance of stores on hand in the storeroom.

The illustration in Figure 40 shows how the record may be worked to disclose this information. Entries must be made in accordance with instructions at the top of the form. The data shown in the center of the form explain two methods of proof possible: one applying to the proof of the form; the other applying to the entire run of postings. Instructions as given in the smaller outline headed, "To prove each card," must be followed, and when these rules are applied to entries applicable, the reader will realize that the proof of the individual card is absolute.

Under the heading "To prove the run," the reader should observe the necessary information relative to proving the entire run of postings. This complete illustration makes the record shown self-explanatory.

It should be borne in mind that under the system described it is necessary to withdraw those cards to which postings are to be made, and care should be taken to see that each card balances

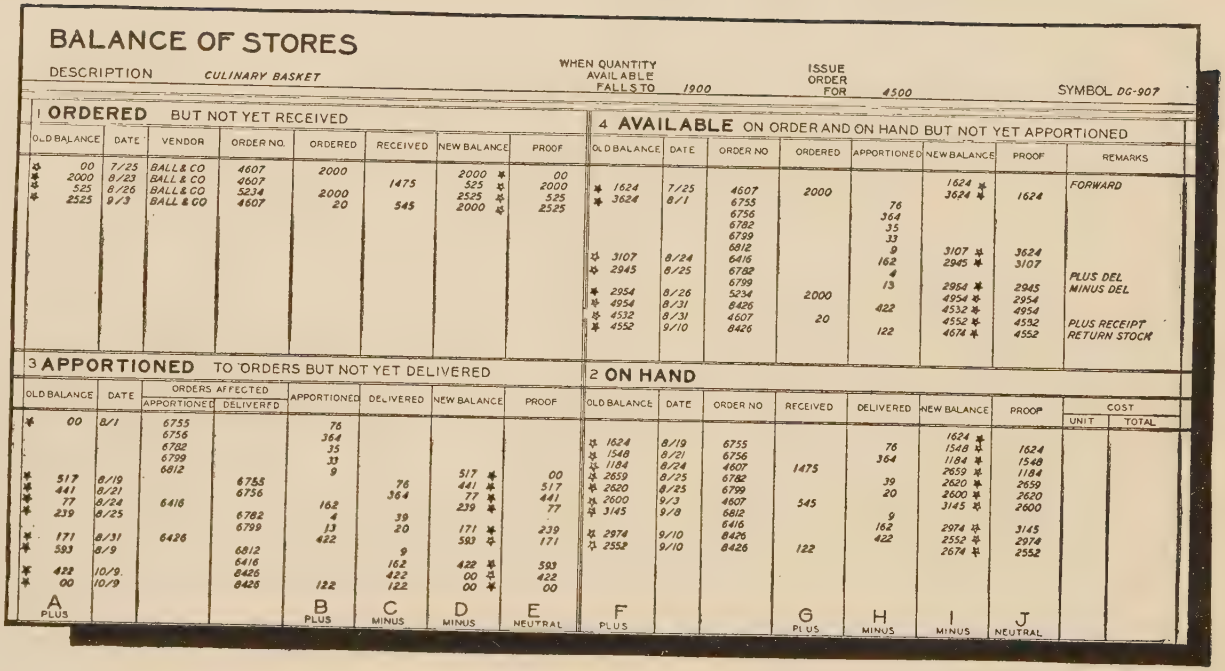
as it is withdrawn. It may also be stated that when machining a record of this kind, no proof column is necessary. From twelve to fifteen record cards may be inserted in a machine equipped with a flat-writing platen at one time; the top card being posted and withdrawn, leaving the next card in writing position, and when posted withdrawn, and so on until the entire fifteen cards have been posted and proved. Each entry affects two balances on the card, which will be observed by careful study of the illustration.

Two mechanical accounting machine plans will be discussed for the purpose of illustrating the practicability of machining raw stores quantity records. The first plan to be discussed will be that of applying flat-writing platen equipment to a routine based on the following requirements and specifications:

1. A continuous quantity record for each stores material or account, providing:
   (a) Quantity ordered but not yet received.
   (b) Quantity available, i.e., on order plus on hand, but not apportioned to production or sales orders.
   (c) Quantity apportioned to orders but not yet delivered.
   (d) Quantity on hand.
2. In conjunction with the quantity record data as to values as follows:
   (a) Total values of balance of material on hand at the end of each month.

The plan provides for obtaining on one card four proved balances which are essential to absolute control of stores. These balances are as follows:

1. Quantity ordered but not received.
2. Quantity available.
3. Quantity apportioned.
4. Quantity on hand.



BALANCE OF STORES

DESCRIPTION *CULINARY BASKET* WHEN QUANTITY AVAILABLE FALLS TO *1900* ISSUE ORDER FOR *4500* SYMBOL *DG-907*

1 ORDERED BUT NOT YET RECEIVED

OLD BALANCE	DATE	VENDOR	ORDER NO.	ORDERED	RECEIVED	NEW BALANCE	PROOF
✱ 00	7/25	BALL & CO	4607	2000		2000 ✱	00
✱✱ 2000	8/23	BALL & CO	4607		1475	525 ✱	2000
✱✱ 525	8/26	BALL & CO	5234	2000		2525 ✱	525
✱ 2525	9/3	BALL & CO	4607	20	545	2000 ✱	2525

3 APPORTIONED TO ORDERS BUT NOT YET DELIVERED

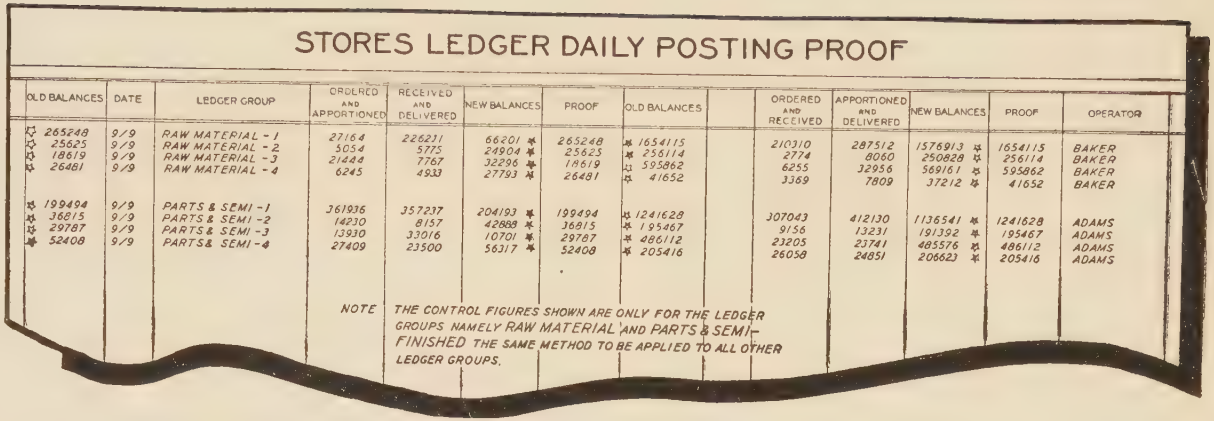
OLD BALANCE	DATE	ORDERS AFFECTED APPORTIONED	ORDERS AFFECTED DELIVERED	APPORTIONED	DELIVERED	NEW BALANCE	PROOF
✱ 00	8/1	6755		76			
		6756		364			
		6782		35			
		6799		33			
		6812		9		517 ✱	00
✱ 517	8/19		6755		76	441 ✱	517
✱✱ 441	8/21		6756		364	77 ✱	441
✱ 77	8/24	6416		162		239 ✱	77
✱ 239	8/25		6782	4	39		
			6799	13	20	171 ✱	239
✱ 171	8/31	6426		422		593 ✱	171
✱ 593	8/9		6812		9		
			6416		162	422 ✱	593
✱ 422	10/9		8426		422	00 ✱	422
✱ 00	10/9		8426	122	122	00 ✱	00
A PLUS				B PLUS	C MINUS	D MINUS	E NEUTRAL

4 AVAILABLE ON ORDER AND ON HAND BUT NOT YET APPORTIONED

OLD BALANCE	DATE	ORDER NO	ORDERED	APPORTIONED	NEW BALANCE	PROOF	REMARKS
✱ 1624	7/25	4607	2000		1624 ✱		FORWARD
✱ 3624	8/1	6755		76	3624 ✱	1624	
		6756		364			
		6782		35			
		6799		33			
		6812		9	3107 ✱	3624	
✱ 3107	8/24	6416		162	2945 ✱	3107	
✱ 2945	8/25	6782		4			PLUS DEL
		6799		13	2954 ✱	2945	MINUS DEL
✱ 2954	8/26	5234	2000		4954 ✱	2954	
✱ 4954	8/31	8426		422	4532 ✱	4954	
✱ 4532	8/31	4607	20		4552 ✱	4532	PLUS RECEIPT
✱ 4552	9/10	8426		122	4674 ✱	4552	RETURN STOCK

2 ON HAND

OLD BALANCE	DATE	ORDER NO	RECEIVED	DELIVERED	NEW BALANCE	PROOF	COST UNIT	COST TOTAL
✱ 1624	8/19	6755			1624 ✱			
✱ 1548	8/21	6756		76	1548 ✱	1624		
✱ 1184	8/24	4607	1475	364	1184 ✱	1548		
✱ 2659	8/25	6782			2659 ✱	1184		
✱ 2620	8/25	6799		39	2620 ✱	2659		
✱ 2600	9/3	4607	545	20	2600 ✱	2620		
✱ 3145	9/8	6812			3145 ✱	2600		
		6416		9				
				162	2974 ✱	3145		
✱ 2974	9/10	8426		422	2552 ✱	2974		
✱ 2552	9/10	8426	122		2674 ✱	2552		
F PLUS			G PLUS	H MINUS	I MINUS	J NEUTRAL		



STORES LEDGER DAILY POSTING PROOF

OLD BALANCES	DATE	LEDGER GROUP	ORDERED AND APPORTIONED	RECEIVED AND DELIVERED	NEW BALANCES	PROOF	OLD BALANCES		ORDERED AND RECEIVED	APPORTIONED AND DELIVERED	NEW BALANCES	PROOF	OPERATOR
265248	9/9	RAW MATERIAL - 1	27164	226231	66201	265248	1654115		210310	287512	1576913	1654115	BAKER
25625	9/9	RAW MATERIAL - 2	5054	5775	24904	25625	256114		2774	8060	250828	256114	BAKER
18619	9/9	RAW MATERIAL - 3	21444	7767	32296	18619	595862		6255	32956	569161	595862	BAKER
26481	9/9	RAW MATERIAL - 4	6245	4933	27793	26481	41652		3369	7809	37212	41652	BAKER
199494	9/9	PARTS & SEMI - 1	361936	357237	204193	199494	1241628		307043	412130	1136541	1241628	ADAMS
36815	9/9	PARTS & SEMI - 2	14230	8157	42888	36815	195467		9156	13231	191392	195467	ADAMS
29787	9/9	PARTS & SEMI - 3	13930	33016	10701	29787	486112		23205	23741	485576	486112	ADAMS
52408	9/9	PARTS & SEMI - 4	27409	23500	56317	52408	205416		26058	24851	206623	205416	ADAMS

NOTE THE CONTROL FIGURES SHOWN ARE ONLY FOR THE LEDGER GROUPS NAMELY RAW MATERIAL AND PARTS & SEMI-FINISHED THE SAME METHOD TO BE APPLIED TO ALL OTHER LEDGER GROUPS.

Figure 41. Raw Stores Quantity Record. Forms Used on Flat-Writing Platen Machine

The column provided on the forms illustrated in Figure 41 for values is of a memorandum nature only, since it may be desired to maintain a continuous or daily balance of values. No adding register should be used over the column of Total Cost. The figures for entering in this column are figured at the end of the month, and may be posted on the machine or by hand. However, if automatic totals by ledger group are desired, one additional adding register should be installed and placed over this column.

On individual stores ledger sheets, after each double entry (each posting medium affects two sections of the form) the following equalities must exist:

1. In each of the four sections: Old Balance plus Increase minus Decrease equals New Balance.
2. Between sections: Balance in 1 plus 2 equals 3 plus 4, e.g., September 8: 2,000 plus 2,974 equals 422 plus 4,552, or 4,974.

The routine may be maintained with a minimum of effort and time not only when handling regular transactions but also adjustments such as the following:

1. Deliveries to the factory in excess of, or less than, the amount apportioned;
2. Variation in receipts as compared with quantities ordered from vendors;
3. Returns of material from factory to the stockrooms.

Stores Ledgers Daily Control.—An example will serve to make clear the use of this form, to which is posted the day's totals in the machine registers after posting to accounts in each ledger, as described under the Machine Operation II, page 345. Assume the following volume for ledger No. 4 in the parts and semi-finished group.

As is evident, each posting medium affects two sections of the forms and four registers. Therefore, the total of the

	Units
A: 100 Purchase Orders Totaling	15,434
B: 121 Vendors' Invoices (Receiving Memorandums attached) Totaling	10,624
C: 101 Apportionments Totaling	11,975
D: 110 Deliveries to Factory Totaling	12,876
Predetermined Total	50,909

amounts in the eight registers should equal twice the total of the combined units for all postings.

The first check, therefore, to determine the accuracy of the work, is to combine the totals in the following columns:

Column	Units
B	27,409
C	23,500
G	26,058
H	24,851
Total	101,818
Divided by 2 equals	50,909

If this total divided by 2 agrees, as in this example, with the predetermined total, this is proof that the correct amounts have been posted. If, however, the totals do not agree, the next step is to determine in what column the error was made. This operation is as follows.

Posting Medium	Register Affected			
	B	C	G	H
A—Purchase Orders	15,434		15,434	
B—Invoices		10,624	10,624	
C—Apportionments	11,975			11,975
D—Delivered		12,876		12,876
Totals of Columns	27,409	23,500	26,058	24,851

It will be noted that the error will be found in the column of individual ledger sheet or sheets corresponding to the column on the daily sheet shown to be incorrect.

To find the error check the posting media for the columns affected against the entries and make corrections.

The second check for proving balances is as follows:

	Columns		
Plus	Minus	Equals	Proof
A and B.....	C	D	E equals A
F and G.....	H	I	J equals F

Machine Operation

I. *Preparation for Machine Operation*

1. The following posting media are sorted in order of stores ledger accounts affected:

(a) Purchase orders.

(b) Vendors' invoices and supporting receiving memorandums.

(c) Apportionment memorandums (production or sales orders).

(d) Requisitions (showing deliveries to factory for use on production or sales orders).

2. Totals of quantities on each medium are taken for each ledger of each group, e.g.:

Purchased—raw materials
Purchased—finished supplies
Purchased—miscellaneous
Manufactured parts
Manufactured assemblies
Manufactured complete product

3. Totals for the four classes of media affecting each ledger are combined. The use of the media referred to has been previously explained.

4. Media are resorted so that all media affecting each ledger account are together.

5. Ledger is "stuffed" with media.

II. *Machine Operation*

1. The first ledger sheet affected is placed on writing surface of machine and all media are posted complete before posting to

next sheet. As posted, the media are arranged in six piles, according to class of medium.

No proof sheet is used in this operation, nor is it essential. Periodically during the posting operation, the operator should prove that the balances are correct, by the following simple calculation:

Balances in ledger section 1 plus 2 should equal
Balances in ledger section 3 plus 4.

If invoices show quantities to be posted to more than one material account after posting to first account affected, the item posted should be checked and the medium advanced until all items appearing thereon are properly disposed of.

2. After completing posting of each ledger, adding registers have automatically accumulated totals for all columns affected. The "Stores Ledger Daily Posting Proof" is then placed on the writing surface of the machine and totals appearing in adding registers are typed on the posting proof.

3. Predetermined totals are then checked with totals as shown on daily posting proof.

The forms described for use on a flat-writing platen machine may be employed on cylindrical-printing platen machines with only a slight and unimportant alteration of the copy.

System Employing Cylindrical-Printing Platen Equipment.—Each machine has its advantages. The advantage of the cylindrical-printing platen machine is that it is more nearly automatic, in that it prints the results of all calculations, while the flat-writing platen machine merely indicates such results on a dial or counter, commonly referred to as a "register," for the operator to copy as in typewriting. The advantage of the flat-writing platen machine is that it is capable of typewriting letters as well as figures, and where it is desirable to incorporate the writing of words, sentences, or mnemonic symbols in the posting, this advantage may be considered a very important one. The capacity in this respect of the cylindrical-printing platen machine is: printed month and day, four code

numbers, and the choice of any one of nine letters. In the matter of proof methods, one machine is about as convenient as the other, and both are equally positive. The principal difference, which is one of form only, is in the old-and-new-balance proof. The flat-writing platen machine accumulates the footing of the new balances and of the difference between this footing and a predetermined total of the old balances which should equal the predetermined total of the posting media.

Card Designs.—As was previously mentioned, the essential points of information concerning any item of stores which are required to give the complete status of the stores are as follows:

1. Balance on order.
2. Balance on hand.
3. Balance apportioned.
4. Balance available.

These particulars constitute what may be termed base requirements, and the card employed is designed on this base as illustrated in Figure 42. The Complete Lots column often shown on standard balance of stores sheets is merely a subdivision of the balance on hand, just as in this routine the amount shown "In Storehouse" is a similar subdivision of the same balance. But these are merely variations of form; the base itself is not changed. For the sake of simplicity and clearness, this description will be confined, so far as possible, to the base card.

Distinctive Features.—The particularly distinctive features of the card under discussion are:

1. Separation of the transactions or posting field from the balance field.
2. The unit line feature.
3. The peculiar mechanical result obtained by the combination of these two features.
4. The supplementary pencil columns.

These features will be described in detail in the order mentioned.

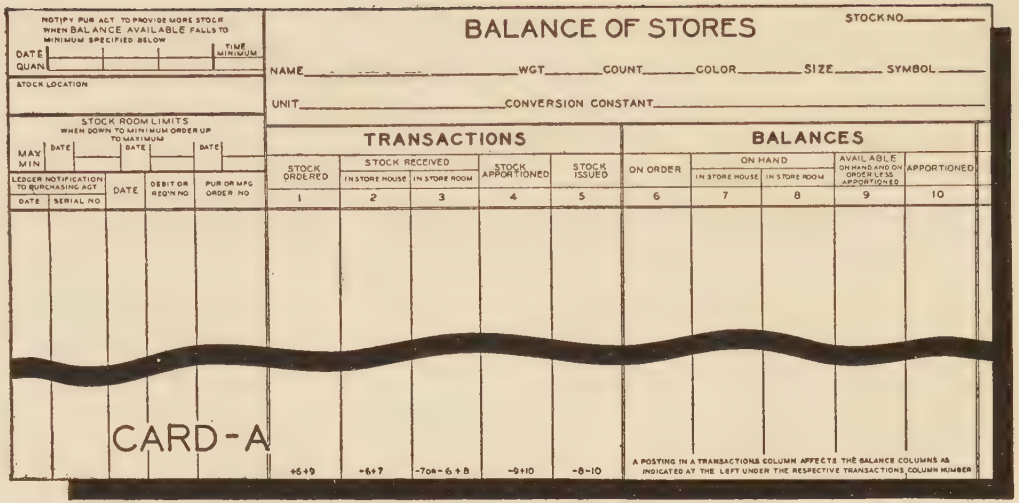


Figure 42. Raw Stores Quantity Record. Card A Used on Cylindrical Platen Machine

Separation of the Transactions or Posting Field from the Balance Field.—Because of this feature all of the balances appear in a field by themselves, and consequently the complete list of essential particulars regarding the status of any item, viz., the balance on order, on hand, apportioned, and available are readily seen at a glance. No skipping from one section of a card to another to obtain these balances is required. This is particularly convenient when making up extensive reports from ledger cards. Comptometer operators or clerks entirely unfamiliar with ledger cards can take these cards and draw therefrom any designated particular practically as readily as regular ledger clerks. This makes it possible to split any given ledger up into as many sections as there are comptometer operators or other clerks available, and to draw a complete ledger report in a surprisingly small amount of time. Under this method an inventory may be drawn of an entire division of the ledger, consisting of 600 cards, in approximately one hour by splitting the ledger into seven or eight sections.

The Unit Line Feature.—This provides that the complete status of stock on any given date can be read by following one line straight across the card. It also renders unnecessary the repetition of date and distinguishing order or symbol numbers. The unit line feature renders it easy, not only to read the status, including the individual transaction or posting against the latest date, but also renders it equally easy to read the status against any past date. On the cards herein described the status on past dates can be read by simply selecting the date in the single date column, against which the status of stock is desired, then reading all particulars on the same line to the right all the way across the card.

The mechanical result of the combination of the two features just described makes it possible to utilize the mechanism of the cylindrical-printing platen machine in posting (and to a certain degree this would be true of the flat-writing platen

machine). It is this feature that makes the posting operation so nearly completely automatic, and that makes possible an unusually positive method of proof.

Inasmuch as the posting in any given column in the transactions field always affects certain respective columns in the balances field, and inasmuch as all these transactions and their corresponding balances are on the same line, stop bars and control bars can be set up in advance for all kinds of possible postings to the card. Then, by classifying the postings into runs of the same variety, i.e., to be posted as single runs, not alternated with postings of different classes—all that is required is to insert the stop and control bar of the number corresponding to the column number in which the class of postings to be run would fall, and the machine will automatically stop the carriage only at the columns in both the transactions and the balances fields which are fixed by this class of postings. This set-up will also cause the machine to operate in the subtract or in the add position in the balances field, depending upon the nature of the posting appearing in the transactions field. For example, suppose that a run of postings covering apportionments were being started. Stop and control bars No. 3, corresponding with column 3 on card B, shown in Figure 43 would be inserted in the machine. The carriage would then automatically stop in consecutive order at date, order number, stock apportioned (column 3) balance available (column 7), and balance apportioned (column 8). The control bar would cause the machine to subtract the amount of the posting from the old balance in column 7 and to add the remainder to the old balance in column 8, all this without the necessity of the operator coming to a mental decision as to what columns are affected, or as to whether the operation is a plus or a minus one. In addition, the machine makes the actual calculation and prints the results. That is, a cylindrical-printing platen machine may be obtained to do this. With a flat-writing platen machine installation, the operator would be obliged to print

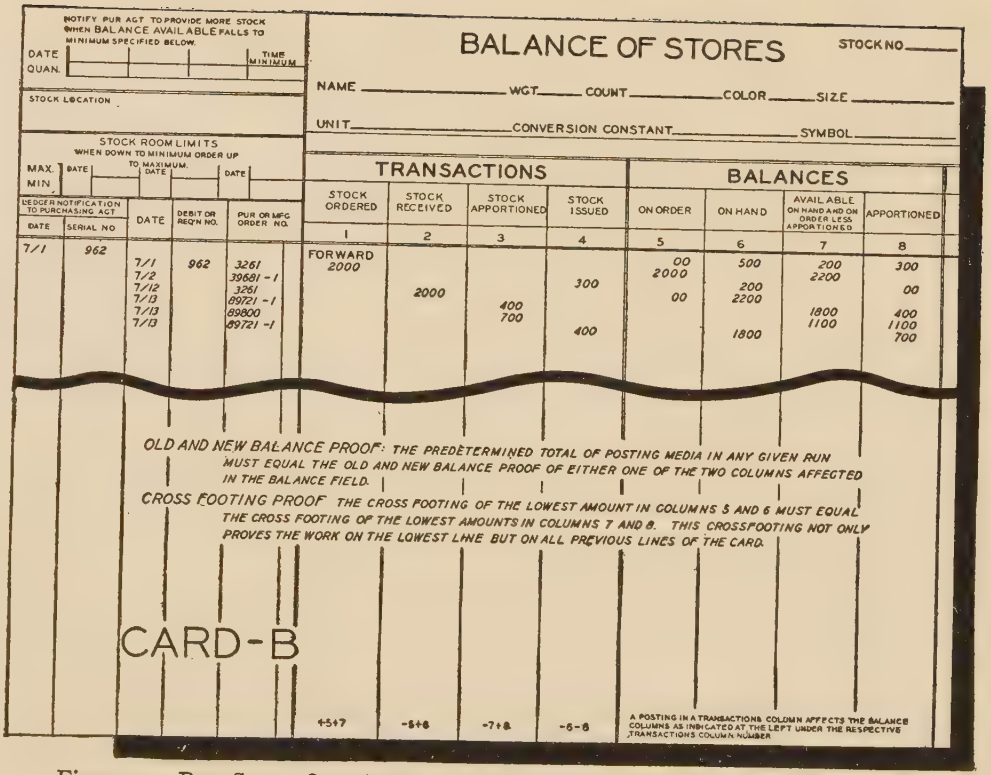


Figure 43. Raw Stores Quantity Record. Card Used on Cylindrical Platen Machine

the figures manually as in typewriting, taking the reading from a visible dial on the adding register on the machine.

At the foot of each card it will be noted that the key to the columns affected by each operation is printed in detail. Thus a normal posting in column 1 of card B adds to columns 5 and 7. Stop and control bars for each column are provided in advance, and may be carried in a compact wooden cabinet with numbered pigeon holes, suspended vertically from the frame at the right side of the machine. The changing of these bars is a matter of seconds. While the changing of the bars is a very short operation, an economy of time to post on one class of postings as long as possible may be effected, thus keeping the operation of changing stop bars, and more particularly the changing of classes of posting on the part of the operator, down to a minimum.

Perhaps the arrangement of columns 7 and 8 on card B will be questioned by the reader. Logically the apportioned column, 8, should appear before the available column, 7. The positions of those two columns were reversed for purely mechanical reasons which are peculiar to a certain type of cylindrical-printing platen machines for which these forms are designed.

In the opinion of the authors, the expression "balance provided for" is a preferable term to "balance available," since the former is more nearly descriptive of the actual status of the stores so designated. The two columns at the extreme left of the card are intended for pencil or pen notation only. The check may be made in columns 3 and 4 to indicate respectively the apportionments which have been assigned, and the assignments which have been issued, the latter operation showing the stock which had been assigned and had actually left the stockroom. A complete physical inventory of stock on hand would, therefore, consist of the sum of the balance in column 6 plus any unchecked items in column 4.

Where it is found necessary to separate the amount of stores

in storehouse in cases, and the amount actually in open storeroom, columns 2 and 7 illustrated on card A (Figure 42), provide the necessary subdivisions of columns 2 and 6 respectively on the base card illustrated in Figure 43, and practically correspond to the "complete lots" column.

Machine Operation.—The operation of the cylindrical-printing platen equipment is as follows:

The Posting of the Card is accomplished as follows. First, the date and all order numbers are recorded on the keys of the machine and the machine operated, i.e., caused to print. The date and order number columns are so arranged that, with a machine having 9 numerals and a date and "folio" field, one operation of the machine suffices to print both date and all order numbers at once. The carriage then automatically moves to the column in the transactions field in which the posting is to appear. This posting is introduced into the machine and the machine operated. Carriage then moves to the first of the two columns, in the balance field to be affected. It should be noted that up to this point the machine is not cleared; the original posting is still "in" the machine. The operator now throws the carriage back (i.e., tips it forward) and "reads" the latest previous old balance in the column at which the carriage has stopped introducing same into the machine. This is printed with the carriage of the machine back to avoid contact of the platen with printing mechanism. The operator then returns the carriage to printing position and clears the machine, which prints the sum (or the difference) as a new balance. The carriage now automatically moves to and stops at the second of the two balance columns affected. Inasmuch as the printing of the previous balance has "cleared" the machine, it is necessary to repeat the original posting as well as introduce the previous balance in order to obtain the sum or the difference to be printed as a new balance. In this operation both the original posting and the previous balance are printed with the carriage

back to avoid contact of platen with printing mechanism, so that only the actual balance shows in the column.

It is this feature of printing certain amounts with the carriage back that is often considered a disadvantage. Experience, however, has shown that this is not so serious, as will be described in detail in the discussion of proof methods which follows.

Special Adjustments for Special Posting Processes. There are at times installations in which a few special entries may be required to be handled in a special way. By working out in advance the effect on the respective balance columns of a posting in any of the transactions columns, and then making up a separate set of stop and control bars for each kind of posting, the calculation and the entire posting operation, except merely operating the keys, can be left to the machine.

As an illustration of this, stores, after having been received, might be ordered directly into open stock, i.e., into the stockroom without passing through the storehouse. To meet this condition, a stop bar may be made up to stop at the date and order columns, card A, and then at column 3, column 6, and column 8. The operation is to post the amount in column 3, subtract that amount from column 6 and add to column 8. Columns 2 and 7 are simply ignored in the operation.

Another special stop bar that may afford great convenience is one which will permit the posting of both the apportionment and the issue of a quantity of stores at the same time. This operation would occur in orders for immediate shipment, for "shorts" on previous orders, and for requisitions which were presented for immediate filling. The bars to control this operation are as follows. Carriage stops at usual date and order columns, card A, then moves to column 4, where the posting is entered as an apportionment. The repeat key, however, is depressed for this posting so that when the carriage moves to column 5, the same amount is repeated in that column auto-

matically without the operator touching the keys a second time. This avoids any possibility of repeating the posting incorrectly. Carriage then moves to column 8 where the amount is deducted from the old balance, and then to column 9 where a similar deduction is also made. Column 10 is not posted. The net result of the posting, however, is exactly the same as if a separate apportionment had first been put in as a posting to column 4, adding to column 10 and subtracting from column 9, and secondly, as an assignment in column 5 subtracting from column 8 and from column 10. This same set of stop bars may be used for cancelling both an apportionment and an issue by simply holding the control lever to the add position when taking the balance so that the posting is exactly the reverse of the above, namely, an addition to column 8, and an addition to column 9. The reason for repeating the original posting in both columns 4 and 5 is to pass absolutely all issues of stock through the Apportioned as well as through the Issued column. If it is desired to know the total apportionments at a certain date, the Stock Apportioned column must include every item which has passed over the ledger.

Make-up of Stop and Control Bars. No general specifications as to the method of making up the stop bars and control bars for the various columns is included in this description because each operation requires special bars. One specific set-up, however, is described, since the plan might not readily suggest itself to an adjuster who had not made a study of this particular problem peculiar to certain machines equipped with flat-printing platens.

In posting for assignments in the Stock Issued column, 5, card A, it will be noted that the posting is a minus quantity in both of the balance columns. When the machine is cleared, as on the completion of the balance in the first of the two balance columns, the setting of the machine automatically assumes the add or plus position. A posting, therefore, to the

second balance column would be entered as a plus quantity unless special means were taken to prevent it. The posting could be entered as a minus quantity in column 10 by holding the hand control lever of the machine to the subtract position. But this introduces a hand operation, and therefore, a mental decision which to that extent makes the operation non-automatic and liable to error. Bars may be provided so that carriage will stop at columns 5 and 8, clearing machine. Carriage may also be provided with a stop so that the carriage will stop at column 9 where a special control block puts the machine in the minus position. While stopped at column 9, the posting —but not the old balance—is put into the machine with the carriage back to avoid contact of platen with the printing mechanism of the machine. After the posting has been recorded on the machine, carriage then moves to column 10, once more assuming the plus position, in which position previous old balance is introduced. The machine is then operated and the result printed which will show the difference between the minus amount of the posting and the plus amount of the previous old balance, a result which is obtained by means of a strictly automatic operation throughout.

Limits. The routine being discussed provides that the ledger clerk notify the purchasing agent so soon as the balance available falls to a predetermined limit, writing by hand the notification blank number and date in the pencil column at the left of the card. The purchasing agent thereupon orders stock and dispatches duplicate purchase order to the ledger where it is posted as "stock ordered" to the respective card.

A separate set of stockroom limits are maintained, and when the balance on hand in the stockroom falls to the minimum, the stock is replenished to maximum. This operation is attended to by a ledger clerk. This function not only takes the responsibility away from the stockrooms but results in keeping a much more uniform stock on hand in the stockroom for the

reason that the stockroom minimum will show on the ledger cards as having been reached before this condition is known in the stockroom. By the time stock is actually diminished to the minimum, the replenishing stock from the storehouse is at hand for the stockroom.

Method of Proof.—The method of proof consists of two distinct operations: (1) the so-called "old-and-new-balance" proof; (2) a cross-footing of the lowest balances appearing in the balances field. The first mentioned proof is applied to only one of the two balance columns affected by any group of postings and insures the fact that all postings on which the proof applies have been correctly transcribed from the posting media, and that all old balances in the balance column so proved have been correctly introduced into the machine, and all new balances have been correctly printed by the machine. The second, or cross-footing proof, insures that all old and new balances in the second balance column affected are correct, and that a number of other conditions are also correct as are detailed later under a "comparison of proof methods."

The Old-and-New-Balance Proof. Posting media may be divided into convenient posting groups up to fifty tickets wherever possible (although under certain peculiar conditions it may be necessary to reduce the media of posting groups to 3 or 4 tickets). Each of these posting groups is then totaled, the amount shown constituting a "predetermined total" to which the old-and-new-balance proof must check.

The old-and-new-balance proof is taken, as stated above on only one of the two balance columns affected by the group of media which has been posted. Generally this will be the first of the two balance columns, but if this happens to be the "balance available," which is apt to contain numerous minus quantities, the proof is sometimes shifted to the other column, viz., "balance apportioned," in which very few minus quantities occur. This is done wholly for the sake of speed. Minus

quantities are as easy to handle by this method of proof as are plus quantities, but not quite so much speed is attained with a long series of them, particularly if the machine operator happens to be a beginner.

In obtaining this proof a key is depressed on the machine, which causes the carriage of the machine to move alternately from the add to the subtract position, the previous or the "old balance," if a plus quantity, being introduced into the machine in the subtract position, and the latest of the new balances, if a plus quantity, in the add position. The difference between these totals is accumulated by the mechanism of the machine itself, and at the completion of the proof a grand total of these differences shows, which, if the work has been correct, equals the predetermined total of each group.

The rule for obtaining the old-and-new-balance proof, whereby minus or plus quantities and normal or cancelling transactions in the same run can be handled with equal certainty, is as follows:

> Old balance to be introduced into the machine in position of opposite sign.
>
> New balance to be introduced into the machine in position of the same sign.

Where all quantities are plus, the alternating action of the machine with the proof key depressed carries out the above rule automatically; but where minus quantities occur the control lever of the machine must be moved by hand to the proper position. This is why a run of postings containing numerous minus quantities requires slightly more time for its completion.

Cross-Footing Proof. The cross-footing proof may be performed by a file clerk on a hand listing machine. The operation consists of cross-footing the lowest quantities appearing in the balances field of the card wherein the total of the first three columns should equal the total of the last two if all work has been correctly performed.

General Verification. A check on the fact that the posting is made on the correct card is obtained by requiring the posting machine operator to compare the title of the card with the posting, thus equally dividing the responsibility with the file clerk that the correct card has been used. A check on the fact that the posting has been made with the correct control bars is obtained by requiring the posting clerk to verify the correctness of the posting column as the first step preliminary to taking the old-and-new-balance proof, and by further requiring the file clerk who makes the cross-footings also to verify the correctness of that column as a first step previous to taking the cross-footing proof.

As cards are proved, a vertical check line is drawn downward to the right of the amounts to show that proof has been obtained up to the point where the line stops.

Comparison of Proof Methods.—The old-and-new-balance proof is positive and absolutely reliable in proving that all posting media were transcribed correctly, that all old balances were introduced into the machine correctly, and that the machine was properly operated in printing the new balance, so far as these results apply to one of the two balance columns, but it is not equally positive to the other. Suppose the old-and-new-balance proof were relied on for verifying both balance columns. Here is what might easily happen. The same predetermined total would be used to balance with both columns, and nothing could be simpler for the operator to note that the result for the first column had agreed with the predetermined total and mistakenly assume because of this agreement that complete proof has been effected. The second column, in which an error may have occurred, would, therefore, go unproved and the error be undiscovered.

The cross-footing proof, on the other hand, once the correctness of one column had been established, would instantly disclose the error in the other column, whether that error

occurred in introducing the posting or the old balance into the machine, or the printing of the new balance. It would not, however, bring to light an error in transcribing the original transfer of the posting from the posting medium to the card. Only a balance with a predetermined total will do that, and therein is a weakness in the cross-footing proof. It is positive in proving the second balance column, and that is where it may be adopted in this specific application.

Another advantage of the cross-footing proof is that it is a verification, not only to the extent that the error has been discovered, but that the card itself has actually been corrected. A weakness of the old-and-new-balance proof is that, whereas under proper conditions it would reveal an error, it would not reveal a neglect on the part of the machine operator to correct that error on the card. The cross-footing, on the other hand, is an absolute proof that the card is actually correct as it goes into the file, since the cross-footing must be taken as a final operation after all corrections have been made, the last thing before the card is filed.

As a final proof, the cross-footing method is an assurance against errors arising from obscure causes which can scarcely be anticipated, but which would cause the two sides of the balance field to be out of balance. Suppose, for instance, that through unexplainable negligence an operator disregarded all signals and actually replaced in the file a card with an error uncorrected. The next time the card was posted, the cross-footing proof would disclose the error, and would continue to disclose it every time a posting were made, until the error was corrected; for a characteristic of the method is that a cross-footing of the latest balances on the card not only proves that the work is correct for the particular entry affected, but also that all the preceding balances up to that point are correct.

Use of Proof Column Explained.—It will be observed that the "Proof" column has been omitted from the forms used

in this specific application, not because of paramount considerations, but because the combined proof methods just described are a real balancing proof in the sense that a trial balance in bookkeeping is a proof, whereas the proof column is usually considered as merely a checking device for use in discovering at what point an error has been made after the fact of the error itself has been discovered by other means. It is the primary function of the proof column to eliminate one type of error with which such a method of proof is of value, viz., an error in introducing into the machine an old balance. It is folly to believe that form designs which incorporate the proof column invite errors. Neither can any form designed without the proof column forestall errors in introducing into the machine old balances. It is true that the proof column is necessarily a different column from that in which the old balance occurs. This precludes the possibility of using the visible printing point at which the proof column stops for introduction into the machine, and which, by the way, is the only visible indicator point on the cylindrical-printing platen machine as a gauge for selecting the old balance. It is regarded by many that since the old balance must be selected by visual inspection of the entire field, no argument is necessary to show how easy it would be to select the wrong figure for the pick-up. On many simple cylindrical-printing platen machine applications the method of getting around the weakness of the so-called unnecessary proof column was to locate that column far enough to the left of the balance column to allow the latter to just show at the side of the machine when the proof column was at the printing point. The lowest figure in the first visible column to the right of the machine would be introduced into the machine as the old balance. But this makeshift has been found wholly impracticable with regular posting machines because of their width requiring a separation of about eight inches between columns for that purpose. By omitting the proof columns entirely, on the other hand, as has been done in the application

being discussed, the picking up of the old balance "in the air," as it is usually called, is made in the balance column itself, and the figure to be picked up is stopped automatically by the carriage immediately over the visible printing point, where, with the carriage back, it is so clearly and conspicuously indicated to the operator that the chance of introducing the wrong figure into the machine is practically negligible. The authors are of the opinion, nevertheless, that the absence of the proof column does not safeguard the application from such negligence which invariably occurs regardless of the type of equipment used.

Since all types of mechanical accounting equipment are automatic, it must be remembered that the first figure (old balance) introduced into the machine in bookkeeping applications must be proved by the machine, and as proof that the introduction of such figures is correct, it is the function of the proof column to prove the accumulative mathematical correctness of the old balance pick-up of each line entry with the account to which that entry has been made.

To correct the misconception that proofs are not necessary in extremely long runs of postings, it should be remembered that some means of checking or comparison must be provided to locate errors as soon as they occur. It must be borne in mind that runs of postings of any length may be proved mathematically in so far as the line entry is concerned by means of the cross-footing proof. But this method does not pin the mistake down to the card on which it was made just as readily as the proof column. A visual comparison of the figure first introduced into the machine may apparently eliminate the necessity of the proof column, and the cross-footing will reveal a much wider range of mistakes than the proof column, but the proof column is used to mechanically check the machine operator against introducing an incorrect previous balance, by merely retyping the amount of the previous balance. It will be seen that no other method but this mechanical performance will

completely eliminate human frailty to err, because every loophole wherein a mistake may lurk during the process of machine operation itself is absolutely closed by reason of the mechanical mathematical proof which the machine established automatically with the comparison of old-and-new balances of each line entry. Extremely long runs should not be accumulated without proof.

One of the most important features of the plan under discussion is the positive control it exercises over the storeroom. This is possible only by posting all tickets before they are presented to the storeroom to be filled, and proving them and releasing them in small lots. No media should be released to the storeroom for issue, or even posted for issue, unless the ledger record shows stock on hand to meet it. In this manner, the ledger controls the storeroom; otherwise the storeroom controls the factory, and the ledger becomes merely an "accessory after the fact."

As a verification that the stock is in agreement with the ledger records, the usual perpetual or daily inventory of a certain number of items of stock should be maintained. The items which have been inventoried should be compared with the ledger records and any disagreements traced and corrected. Items having an ordinary rate of movement once per month should be covered. Very heavy movers should be inventoried at least twice a month, while the very slow movers may be inventoried only once in two months or once in three months.

Filing, Posting, and Verifying Routine.—In an extensive application of machine posting, it is desirable to make provisions for attaining technical efficiency in handling the work. In this particular application both these ends may be attained by the following special plans:

Two operators may be assigned to each posting machine, one of whom acts as a file clerk, finding the cards and obtaining the predetermined totals of the posting media for the operator

who actually does the posting. Under such an arrangement the file clerk may also be trained as a posting clerk as an assurance against holding up the posting machine in case the regular operator should be absent from sickness or any other cause. Besides, it enables the file clerk and the operator to change off with each other's duties two or three times during the day, thus making the work less tedious for both. It also affords a check on the part of a second clerk that the correct card has been drawn and the correct control bars used for posting.

A small listing machine should be provided to operate in conjunction with each of the posting machines. By this arrangement the posting machines can be made to operate practically continuously, whereas if the posting machine operator were obliged to pull cards from ledger trays, and obtain predetermined totals from the posting media for verification, the posting machine itself would either be idle or engaged on non-posting work an unnecessary portion of the time.

All posting media should be reduced to a unit basis, i.e., a separate ticket for each individual posting. This is such an important point in posting efficiency that it should be given special emphasis here. The statement may be ventured that in busy times, when the machine installation is working nearly to capacity, the utilization or the non-utilization of unit posting media might mean the difference between the success or the failure of the entire system. Unit posting media permit preliminary sorting and collating of tickets previous to drawing the cards from the ledger trays, and means vastly more speed in posting.

All posting should be performed in groups of tickets representing the same posting operation, not promiscuously among different operations. Furthermore, the groups themselves should be divided into runs of not too many tickets each, as was previously explained under the discussion of the methods of proof.

Posting media should be thoroughly sorted, classified, and

sub-classified before being passed to the file clerk. This serves to collect all tickets of the same sort together, against which the file clerk will draw the corresponding card; and it enables the machine operator to abbreviate greatly the posting operation by merely listing in the transactions field the individual postings, then taking a sub-total of these postings in the transactions field and completing the process by drawing a single set of balances for the lot rather than individual balances for each separate posting. If the ledger is so large that it is divided into separate sections, the plan of pre-sorting will also serve to allocate to each section the tickets applying thereon.

Convenient furniture and equipment should be provided for speeding up the operation of sorting, filing, and posting. Speed and efficiency cannot be realized under inconvenient physical arrangements or equipment. Insufficient binders and illegible sheets, for instance, will reduce the additional speed over hand posting that a mechanical accounting machine should normally afford. All of the steps of the process from the sorting of the posting media to the final proof of the result should be thought out and worked out until they function smoothly. Three devices that may be provided are worth mentioning here:

1. A small table for the file clerk with a double-deck flat space for laying out ledger cards as drawn from the file, and a space at the side to accommodate a hand listing machine. This table may be mounted on gas-pipe legs fitted with noiseless easily working casters.

2. Small movable standard detachable filing tub. This also should be mounted on gas-pipe legs and similar casters to the file clerk's table.

3. Stationary sorting table with numbered pigeonholes for first classification of posting media.

The filing clerk's tables and filing tubs should be equipped with casters so that any table or file tub can be moved to any posting machine with the greatest facility. An ideal physical

arrangement for posting is: posting and machine operator on the right; file clerk with table on left of posting machine operator; movable tub of file cards to left of file clerk.

The actual posting and proving routine described in this application, while not adaptable in detail for all conditions, may serve as more or less of a basic arrangement from which any desirable variations can easily be made.

1. File clerk obtains predetermined totals and makes cross-footings. Machine operator obtains old-and-new-balance proof. File clerk finds all ledger cards before posting and returns cards to file after posting; takes predetermined totals and makes cross-footings. When delivering cards, machine operator takes old-and-new-balance proof. The file clerk when delivering cards and posting media to the machine operator will accompany each group of posting media with the adding machine strip showing the predetermined total.

2. The file clerk should be responsible to see that all posting media turned over to the machine operator can be posted to the respective cards to which they apply. This refers particularly to apportionments, and in practice it is necessary for the file clerk to see that there is sufficient stock on hand available to fill the tickets which are to be posted against the card. If the aggregate of these tickets exceeds the amount in stock, the file clerk will simply turn the card and the tickets over to the head of the stores accounting department, who will determine either personally or by investigation which of the tickets is to be given preference. This arrangement will allow the file clerk to pass on to the next posting media in the group.

3. While the machine operator is completing the first group, namely, posting the cards and taking the old-and-new-balance proof, the file clerk can be locating the cards and taking the predetermined total of the second group, which should be ready for the posting clerk by the time the posting clerk has proved the first group.

4. When the first group has been proved by the operator and returned to the file clerk, the file clerk will make the cross-footing and afterwards file the cards.

5. The third group of posting media can now be taken up by the file clerk; the cards are located and withdrawn and the predetermined totals listed as before described. The routine thus established provides that, while the machine operator is posting a group and proving it, the file clerk will be cross-footing a previous group and finding the cards and listing the predetermined totals of a succeeding group.

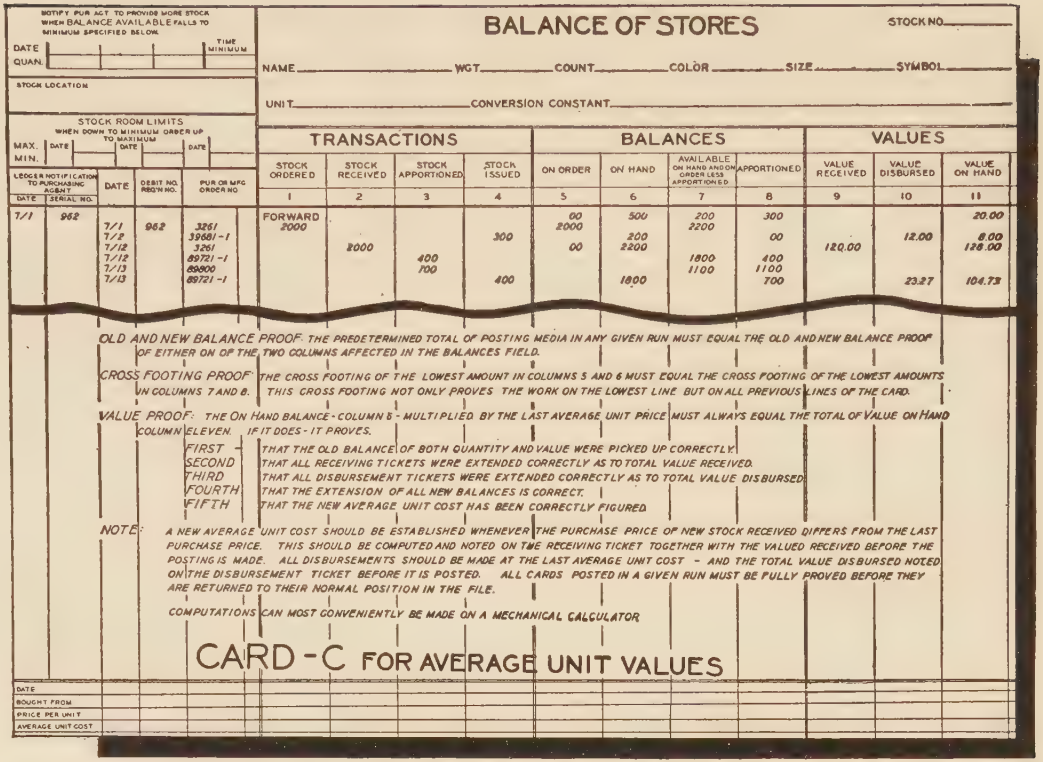
6. It may rarely happen, in spite of the care taken by the file clerk not to hand over to the machine operator any media which cannot be posted to the accompanying card, that the machine operator will discover some reason why a medium cannot be posted to the ledger card. In such cases the machine operator should obtain old-and-new balance of such media as posted, then switch off the proof lever of the machine and add the remaining or unposted media to the total which has already accumulated in the machine. The final total will then correspond, if the work is correct, with the predetermined total.

Transferring Balances from Old to New Ledger Cards.— Under average circumstances the following arrangements for carrying forward old ledger cards to new cards in so far as the application being discussed is concerned, should be adopted:

1. The Apportioned and the Issued columns should be footed and the amounts carried forward in every case from the first to the second side of the card, and from the second side of an old card to the new card. These totals should be cumulative.

2. All balances in the balance field should be carried forward both from the first to the second side of the old card, and from the second side of the old card to the new card. These figures, of course, are not cumulative.

3. The apportioned items in the Issued column which are not checked as having actually been issued from stores should be carried forward from the second side of the old card to the first side of the new card, but need not be carried forward from the first to the second side of the same card. When the unissued amounts are carried forward from one card to another, they should be written in the Issued column below the total which has also been carried forward, but should appear in red ink with the explanation



NOTIFY PUR AGT TO PROVIDE MORE STOCK WHEN BALANCE AVAILABLE FALLS TO MINIMUM SPECIFIED BELOW

DATE / QUAN. / TIME MINIMUM

STOCK LOCATION

STOCK ROOM LIMITS
WHEN DOWN TO MINIMUM ORDER UP TO MAXIMUM

MAX. | DATE | DATE | DATE
MIN.

BALANCE OF STORES

STOCK NO.

NAME WGT. COUNT COLOR SIZE SYMBOL

UNIT CONVERSION CONSTANT

LEDGER NOTIFICATION TO PURCHASING AGENT		TRANSACTIONS					BALANCES				VALUES		
DATE	SERIAL NO.	DATE	DEBIT NO. REQN NO.	PUR OR MFG ORDER NO.	STOCK ORDERED	STOCK RECEIVED	STOCK APPORTIONED	STOCK ISSUED	ON ORDER	ON HAND	AVAILABLE ON HAND AND ON ORDER LESS APPORTIONED	APPORTIONED	VALUE RECEIVED	VALUE DISBURSED	VALUE ON HAND
					1	2	3	4	5	6	7	8	9	10	11
7/1	962				FORWARD 2000				00	500	200	300			20.00
		7/1	962	3261					2000		2200				
		7/12		39681-1				300		200		00		12.00	8.00
		7/12		3261		2000			00	2200			120.00		128.00
		7/12		89721-1			400				1800	400			
		7/13		89900			700				1100	1100			
		7/13		89721-1				400		1800		700		23.27	104.73

OLD AND NEW BALANCE PROOF: THE PREDETERMINED TOTAL OF POSTING MEDIA IN ANY GIVEN RUN MUST EQUAL THE OLD AND NEW BALANCE PROOF OF EITHER ON OF THE TWO COLUMNS AFFECTED IN THE BALANCES FIELD.

CROSS FOOTING PROOF: THE CROSS FOOTING OF THE LOWEST AMOUNT IN COLUMNS 5 AND 6 MUST EQUAL THE CROSS FOOTING OF THE LOWEST AMOUNTS IN COLUMNS 7 AND 8. THIS CROSS FOOTING NOT ONLY PROVES THE WORK ON THE LOWEST LINE BUT ON ALL PREVIOUS LINES OF THE CARD.

VALUE PROOF: THE ON HAND BALANCE - COLUMN 6 - MULTIPLIED BY THE LAST AVERAGE UNIT PRICE MUST ALWAYS EQUAL THE TOTAL OF VALUE ON HAND COLUMN ELEVEN. IF IT DOES - IT PROVES.

FIRST - THAT THE OLD BALANCE OF BOTH QUANTITY AND VALUE WERE PICKED UP CORRECTLY.
SECOND - THAT ALL RECEIVING TICKETS WERE EXTENDED CORRECTLY AS TO TOTAL VALUE RECEIVED.
THIRD - THAT ALL DISBURSEMENT TICKETS WERE EXTENDED CORRECTLY AS TO TOTAL VALUE DISBURSED.
FOURTH - THAT THE EXTENSION OF ALL NEW BALANCES IS CORRECT.
FIFTH - THAT THE NEW AVERAGE UNIT COST HAS BEEN CORRECTLY FIGURED.

NOTE: A NEW AVERAGE UNIT COST SHOULD BE ESTABLISHED WHENEVER THE PURCHASE PRICE OF NEW STOCK RECEIVED DIFFERS FROM THE LAST PURCHASE PRICE. THIS SHOULD BE COMPUTED AND NOTED ON THE RECEIVING TICKET TOGETHER WITH THE VALUED RECEIVED BEFORE THE POSTING IS MADE. ALL DISBURSEMENTS SHOULD BE MADE AT THE LAST AVERAGE UNIT COST - AND THE TOTAL VALUE DISBURSED NOTED ON THE DISBURSEMENT TICKET BEFORE IT IS POSTED. ALL CARDS POSTED IN A GIVEN RUN MUST BE FULLY PROVED BEFORE THEY ARE RETURNED TO THEIR NORMAL POSITION IN THE FILE.

COMPUTATIONS CAN MOST CONVENIENTLY BE MADE ON A MECHANICAL CALCULATOR

CARD - C FOR AVERAGE UNIT VALUES

DATE
BOUGHT FROM
PRICE PER UNIT
AVERAGE UNIT COST

Figure 44. Raw Stores Quantity and Value Record. Form C Used on Cylindrical Platen Machine

"unissued items from card ———." Red ink figures, of course, should not be included in the footing of the issued column to be again carried forward.

Methods of Recording Value.—So far the discussion has been confined to quantity records only without reference to money value. The plan can handle prices and values against quantities with the greatest facility, and in any way desired. If it is desired to control stores under average unit prices, a slight addition to the base card previously described, will take care of the problem. If it is desired to maintain separate lot prices, a card nearly identical in form but handled somewhat differently accomplishes this point.

There are two general plans of carrying value against stores:

1. The plan based on Average Unit Values.
2. The plan based on Separate Values for each price lot.

The two methods are briefly described below in outline form, reference being made against each to the type of card to be used therewith, as shown in Figures 44 and 45. Under both methods a master card may be used to control a group of detailed balance of stores cards. As errors in values can practically always be determined by noting unusual changes in unit prices, it is considered sufficient, as a matter of mathematical proof, to control only quantities. The master card illustrated in the top section of card D (Figure 45), may be maintained to control quantities regardless of whether the average unit value or separate lot value method is used.

A. Average Unit Values

Variation I—No Master Card (Use Card C Shown in Figure 44)

Extend the value for each posting with: (a) actual cost of lot for each receipt; and (b) value figured at latest average unit cost for each disbursement.

Prove quantities by usual combination of old-and-new balance

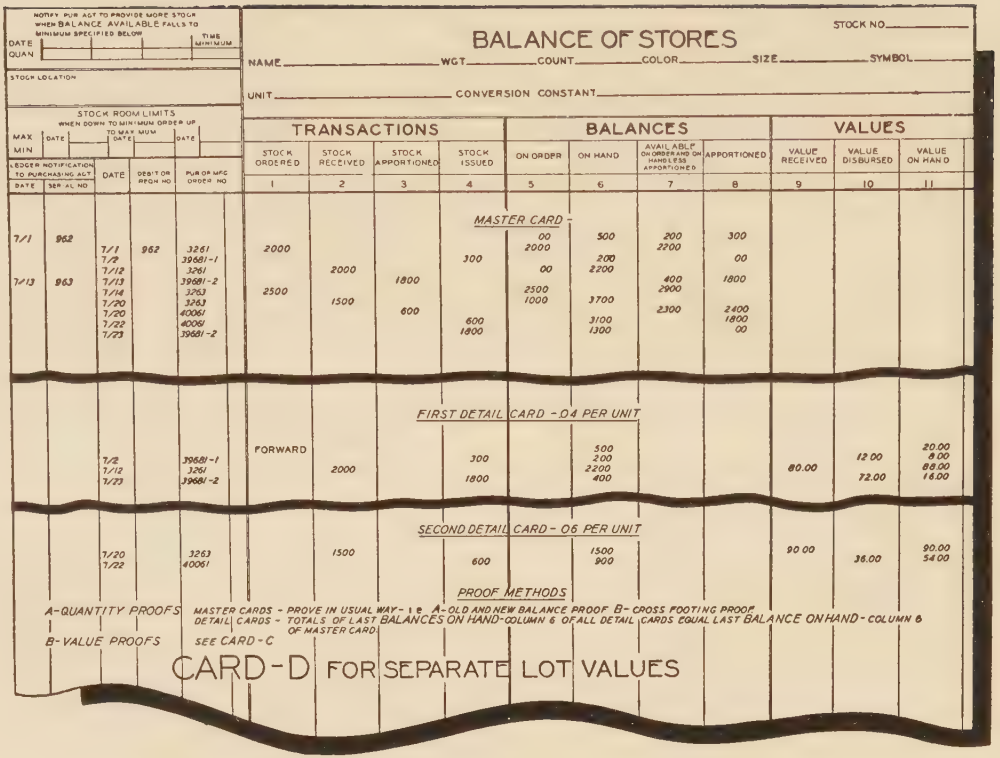


Figure 45. Raw Stores Quantity and Value Record. Form D Used on Cylindrical Platen Machine

and cross-footing proofs, and values by the following special method: the "on hand" balance (column 6), multiplied by the latest average unit price, carried to four or five places of decimals, must always equal the total of "value on hand" (column 11). If it does, it proves so far as that one ledger card is concerned:

1. That the old balance of both quantity and value were introduced into the machine correctly.
2. That all receiving tickets were extended correctly as to total value received.
3. That all disbursement tickets were extended correctly as to total value disbursed.
4. That the extension of all new balances is correct.
5. That the new average unit cost has been correctly figured.

Variation II—Master Card Used (Upper Section, Card D and Card C)

1. Master card—not priced—to which is posted all transactions.

2. Separate detailed cards are maintained, priced, and extended as explained under Variation I above.

Quantity proof only obtained in usual way. Money value when required in total is simply the addition of the values appearing on the detailed cards.

B. Separate Values for Each Price Lot

Variation I—No Master Card (Lower Section, Card D, in Figure 45)

Extend the value for each posting with: (a) actual cost of lot for each receipt; (b) value of each disbursement to be figured on lot price of earliest unused lot on hand at the time of posting.

Prove for quantity in the usual way. Prove for value by adding quantities and values of unused lots on hand which should agree with the balances shown for quantity and value.

Variation II—Master Card Used (Card D in Figure 45)

1. Master card not priced—to which is posted all transactions.

2. Separate detailed cards are maintained, priced, and extended as explained under Variation I immediately above.

Quantity proof only obtained in usual way. Money value when required in total is simply the addition of the values appearing on the detailed cards.

If withdrawals of material are made against unused balance representing more than one lot, separate requisitions will have to be made for the material applicable to each lot withdrawn and must be priced accordingly.

Proof Method

Quantity Proofs:

Master Cards—prove in usual way, i.e., (a) Old-and-new-balance proof; (b) Cross-footing proof.

Detail cards—totals of last balance on hand (column 6) of all cards equal last balance on hand (column 6) of master card.

Value Proof:

Detail Cards—prove in usual way, i.e., (a) Old-and-new-balance proof; (b) Cross-footing proof.

If the difference between the totals of the old and new balances of the detail cards after machine operation is in agreement with the total of all media before machine operation, it proves:

1. That the old balances were picked up correctly.
2. That all receiving tickets were extended correctly as to total value received.
3. That all disbursement tickets were extended correctly as to total value disbursed.
4. That the extension of all new balances is correct.

The master card and detail cards should be of different color to make it practicable to file master cards with and in front of corresponding detail cards. Cards should be oblong, so that different sets can be staggered when withdrawn from the file. It should be understood that card A, on which the balance on hand has been subdivided into five balance columns, is equally adaptable to quantity and value methods by employing in the value field three additional columns as exemplified by cards C and D, and exactly the same methods of posting

and proof are used with one variation. This variation is that when posting receipts, the removal of stores from storehouse to open stock in storeroom (subtracting from column 7 and adding to column B—card A) involves no change in the value on hand. For such postings, therefore, the values should not be extended.

CHAPTER XIII

STOCK AND MATERIAL CONTROL (Continued)

In the preceding chapter consideration has been given to the factors involved in stock and material control routines, and to the questions that a system survey should cover. Stock and material control routine procedures for raw stores with the use of writing and printing accounting machines have been presented in detail. In this chapter routines for raw stores control employing tabulating equipment, as well as procedures for in process, semi-finished, and finished stores, will be explained. In addition, a retail buying and stock control routine is presented in detail for the use of department and specialty stores.

Quantity and Value Stock Record—Punch Card Method.—The following is an outline of the use of electric tabulating and accounting equipment employing a punched card for inventory and material control accounting. This system may be the means of keeping inventories in complete accord with book values at all times by having a perpetual check on stock, thereby eliminating the necessity of large adjustments. From an operative accounting standpoint, great economies may be effected, and reliable and accurate statistical information relating to material control may be secured.

Method and Use of Symbols.—This system provides that all merchandise stores be symbolized, and the following method may be adopted:

A seven digit symbol may be used, the component digits representing:

First two digits—Ledger Account.
Next two digits—Alphabetical Index.
Next three digits—Serial Number.

For example: Symbol 1311001 covers Coal, Oils and Greases, under which would come Kerosene, and the individual digits represent the following:

Ledger Account	Alphabetical Index	Serial Number
13	11	001

The above applies to supply ledgers only. Tools, raw materials, and repair parts may be symbolized according to kind of material, etc.

The symbols of all Manufactured Parts are based on the following method, in which an automobile part is illustrated:

First two digits represent size of joint manufactured.
Next two digits represent name of part.
Next four digits represent Class, such as square hole, round hole, splined end, etc., also limit to be ground to. For instance, 02010104 represents a 200 size companion with square hole.

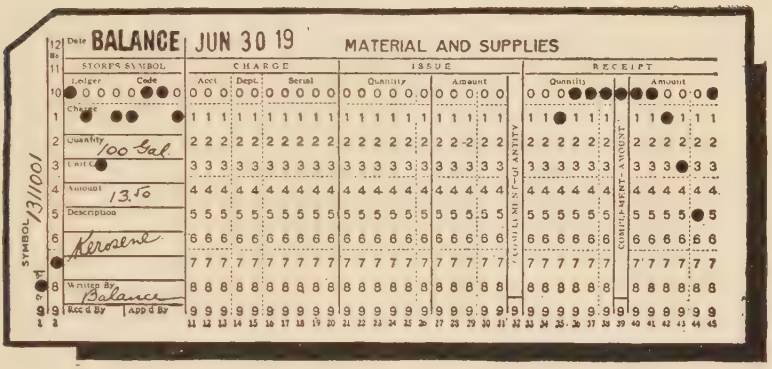
The symbols of all Raw Material represent the following:
First two digits—Ledger Number.
Next two digits—Carbon contents.
Next digit—Kind, such as cold rolled, nickel, etc.
Next digit—Round, square, hexagonal, billets, etc.
Next digit—Bar stock or short ends.

All purchase orders when placed with the vendor must carry a symbol number. A copy of all purchase orders is dispatched to the receiving department and to the department requisitioning the material. When material is received, the receiving department is then able to apply the symbol number to the delivery receipt of material from their copy of the purchase order. The symbol on the delivery ticket is checked with the symbol on the bin ticket when the material is delivered to stores. This operation assures that the correct symbol has been applied. The delivery is then passed to the purchasing department,

where it is matched with the vendor's invoice. The symbol number is then transferred from the delivery receipt to the vendor's invoice.

Explanation of Method and Forms Used.—To begin then, an inventory balance is made up on a tabulating card (Exhibit

EXHIBIT—A



EXHIBIT—B

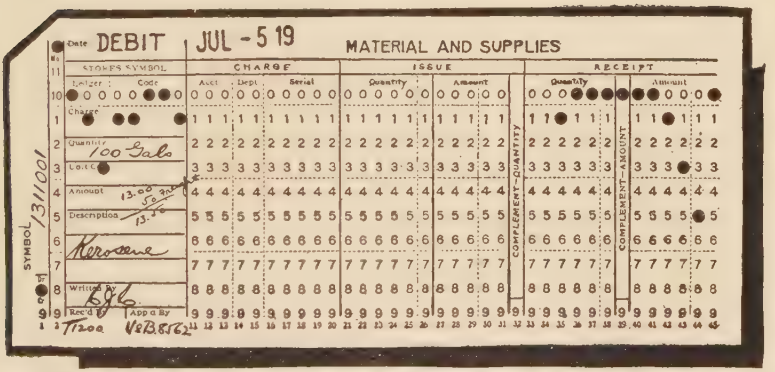


Figure 46. Tabulating Cards for Balance and Debit of Material and Supplies

A, Figure 46) punched to record symbol number, debit inventory, and debit quantity amount.

Debit tabulating cards (Exhibit B, Figure 46) are prepared from vendors' invoices and other sundry debits. A cross-

reference, such as purchase order number, etc., is indicated on all debit cards, so as to facilitate locating the original record at all times without any inconvenience or loss of time.

A tabulating card (Exhibit C, Figure 47) is used as a means of requisitioning material from stores.

The use of such a method places the original information in the stores file. All other credits of whatever nature are made up on this same form, and requisitions and other credits are punched by means of a key punching machine and checked as soon as received, showing symbol number, credit inventory,

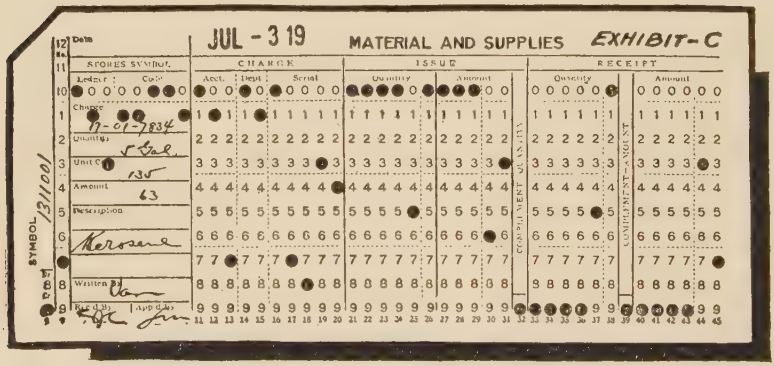


Figure 47. Tabulating Card for Material and Supplies

and credit amount, and the complement of the credit inventory, and the credit amount. This form in two colors is punched in duplicate (two cards at one time). The original (Exhibit C) is immediately filed in the stores record behind the proper tab or index card, together with the various debits, etc., for that account. Thus a file of cards is set up representing all the debits and credits affecting an account. By use of the complement punching of credits, a balance can be procured whenever necessary, of any or all accounts by running the cards through the tabulating equipment.

A separate unit cost file is carried on small cards showing symbol number, description of material, unit of measure, and

the cost price. An average unit cost is used. (Exhibit J, Figure 51, on page 381.)

When the debits are filed, all cards for accounts affected are immediately withdrawn from the file and are tabulated for the new balance from which is established a new unit price. This new unit price remains the same until the receipt of another debit. The unit cost file has been found to be a very convenient means of pricing withdrawals, and at the time the pricing is being performed, the clerk has an opportunity to check the symbol and description on the withdrawal with that appearing on the unit price card, thus eliminating a chance of error. Cards are first checked for differences in unit, and second, for price. It is the duty of the purchasing agent to notify the material control accounting department of any change in material contract prices.

In pricing the stock withdrawals as they are received from stores, the symbol number of the stock issued is checked with the symbol number on the unit cost card. This assures that the material has been identified correctly by stores. After all cards have been punched, they are checked for symbol number and description against the number and description on the tab or index card in tabulating card file, and when filed, effect a double check on the report when tabulated, and on the punching.

The credit card (Exhibit D, Figure 48) is punched in duplicate. The duplicate (Exhibit E, Figure 48) is held for distribution by account, order number, and credits to stores for purposes of journalizing.

The tabulating card (Exhibit E, Figure 48) is also used for the purpose of journalizing data shown in Exhibit F, Figure 49. Further detailed information of these accounts is taken off by order or serial number, showing article, symbol, quantity, and amount for all productive charges, which information is passed to the individual keeping that account (Exhibit G, Figure 49). A distribution of non-productive

charges by non-productive account, department, and machine number, equipment number or tool number, as the case may be (Exhibit H, Figure 49) is readily obtainable from the same cards.

This system provides a control record of the receipts and disbursements by stores accounts. Each lot of vendors' invoices received and the material issued are posted to a control sheet in this record by amount. By this means the amount of all cards in the files is known, which provides an absolute check with the general ledger control account. (Exhibit I, Figure 50.)

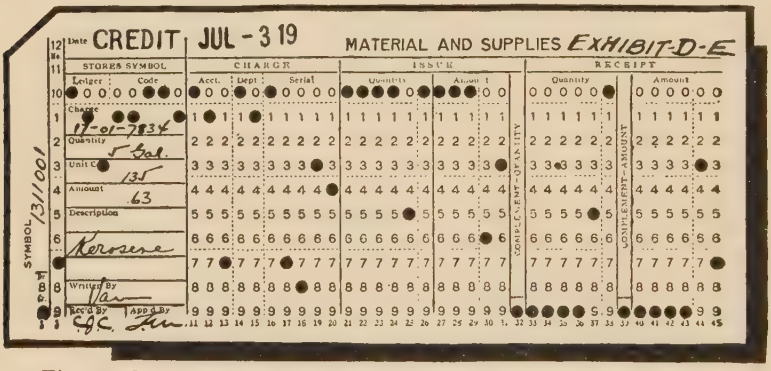


Figure 48. Tabulating Card for Credit to Material and Supplies. This card is perforated in duplicate.

A bin tag (Exhibit K, Figure 51) is used in the stockroom, one for each article in stock, showing symbols, description of material, etc. A record is made on this card by the storekeeper of receipts and deliveries. When this tag is filled, or stock has reached a minimum, a physical count is made by the storekeeper, and the tag is sent to the tabulating department, where it is checked with the accounting records. Any discrepancy is traced and corrected at this point. This serves also as a check on all fast moving materials.

A trial balance is prepared of all stores accounts monthly (Exhibit L, Figure 52), one-third of which is tabulated in

MATERIAL AND SUPPLIES DISTRIBUTION EXHIBIT F

MONTH OF

DEBIT ACCT.	AMOUNT	CREDIT ACCT.	AMOUNT
44	150000	2	500000
45	1050000	3	50000
25	300000	6	550000
		8	400000
	1500000 *		1500000 *

ANALYSIS OF MATERIAL AND SUPPLIES DISTRIBUTION EXHIBIT G

DEBIT ACCOUNT NO. MONTH OF

ORDER OR SERIAL NO	STORES SYMBOL	QUANTITY	AMOUNT
8230	202002	730	2128
8514	202005	263	1316
2145	202095	24	58
8167	202102	63	199
2013	202106	90	281
8416	202122	210	720
4510	202159	65	205

ANALYSIS OF MATERIAL AND SUPPLIES DISTRIBUTION EXHIBIT H

DEBIT ACCOUNT NO. 525 MONTH OF

SUB ACCT & DEPT.	SERIAL	AMOUNT	DEPT. TOTAL
858 12	1 58 1	500	
858 12	1 62 7	500	
858 12	1 78 3	500	1500
858 13	1 12 1	500	500

Figure 49. Distribution Analysis of Material and Supplies

duplicate showing quantity only. That portion of the trial balance sheet indicating quantities is dispatched to the storekeeper, who checks existing inventory physically, noting thereon such differences as are found, and returning the sheet to the accounting department. This procedure effectually checks slow moving articles in stores once every quarter.

The adoption of the inventory method outlined will produce effective results, since an absolute check is maintained on stores, and inventories are taken by the regular storekeepers, using

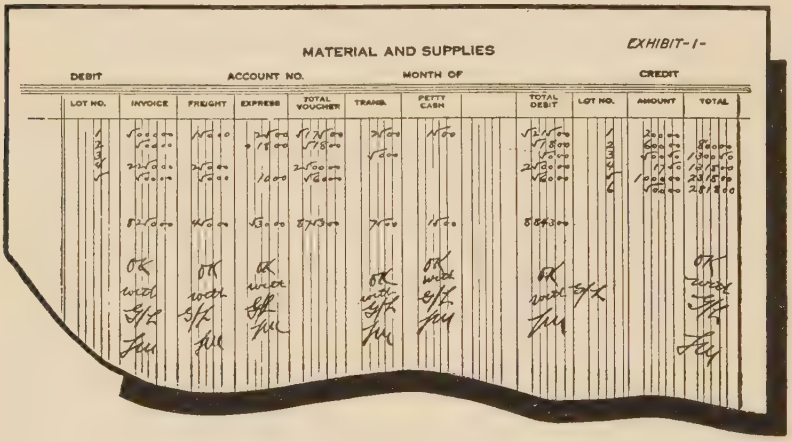
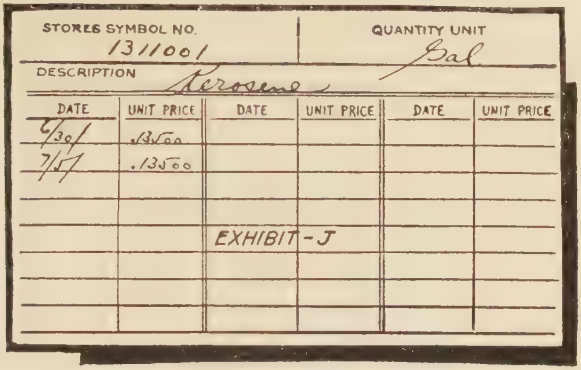


Figure 50. Control Sheet for Material and Supplies

what ordinarily would be idle time. Under this system the stores records are at all times in agreement with the general ledger, and it has been the experience of the authors that adjustments are practically nil, even with a stock of forty thousand articles.

Method of Determining Balance of Stores Position.—The following record is purely a statistical report issued for the convenience of the purchasing and production departments and shows quantities only. It is a means for keeping the quantity of stock within the proper limits without fear of overstocking.

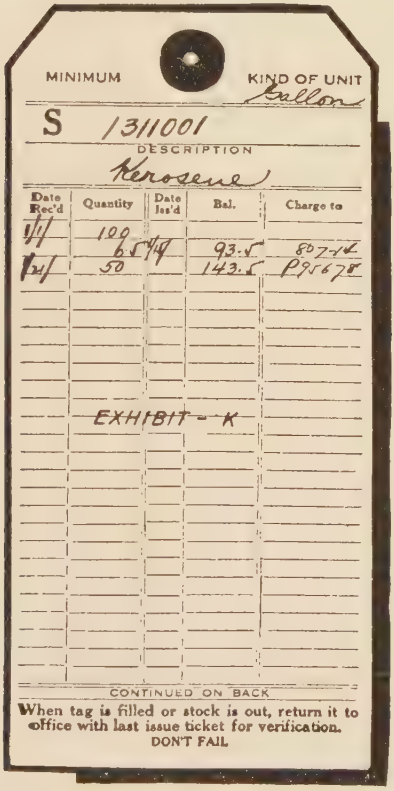


STORES SYMBOL NO. 1311001 QUANTITY UNIT Gal

DESCRIPTION Kerosene

DATE	UNIT PRICE	DATE	UNIT PRICE	DATE	UNIT PRICE
6/30/	.13500				
7/5/	.13500				

EXHIBIT - J



MINIMUM KIND OF UNIT Gallon

S 1311001

DESCRIPTION Kerosene

Date Rec'd	Quantity	Date Iss'd	Bal.	Charge to
1/1/	100			
	6.5	4/4	93.5	807-14
1/21/	50		143.5	P95678

EXHIBIT - K

CONTINUED ON BACK

When tag is filled or stock is out, return it to office with last issue ticket for verification.
DON'T FAIL

Figure 51. Price Card and Bin Tag

ACCOUNT NO. 68.02
SHEET NO. 1

MATERIAL & SUPPLIES

EXHIBIT 1
June 30, 19

DESCRIPTION	SIZE	SYMBOL	QUANTITY	AMOUNT	UNIT COST
		202002	730	2128	
		202005	263	1316	
		202095	24	58	
		202102	63	199	
		202106	90	281	
		202122	210	720	
		202159	65	205	
		202165	95	306	
		202188	90	281	
		209463	640	387	
		209465	682	485	
		209523	1970	668	
		219074	912	539	
		219102	284	184	
		219120	148	291	
		219302	392	105	
		219335	1665	508	
		219360	1720	933	
		219381	1600	1520	
		219388	5440	2002	
		219428	2780	17057	
		219429	2690	16671	
		219462	2400	3358	
		219553	1010	424	
		219569	1575	551	
		219579	2395	16164	
		219609	3350	6460	
		219630	680	2263	
		219650	2380	7141	
				82985	

Figure 52. Material and Supplies Account Sheet

A debit on order card is punched from each purchase order as soon as issued (Exhibit M, Figure 53), showing symbol, purchase order, and quantity on order. The usual cross-reference is made in this case as in inventory debits.

When material is received, a credit on order card (Exhibit N, Figure 53) is punched for symbol, purchase order, credit

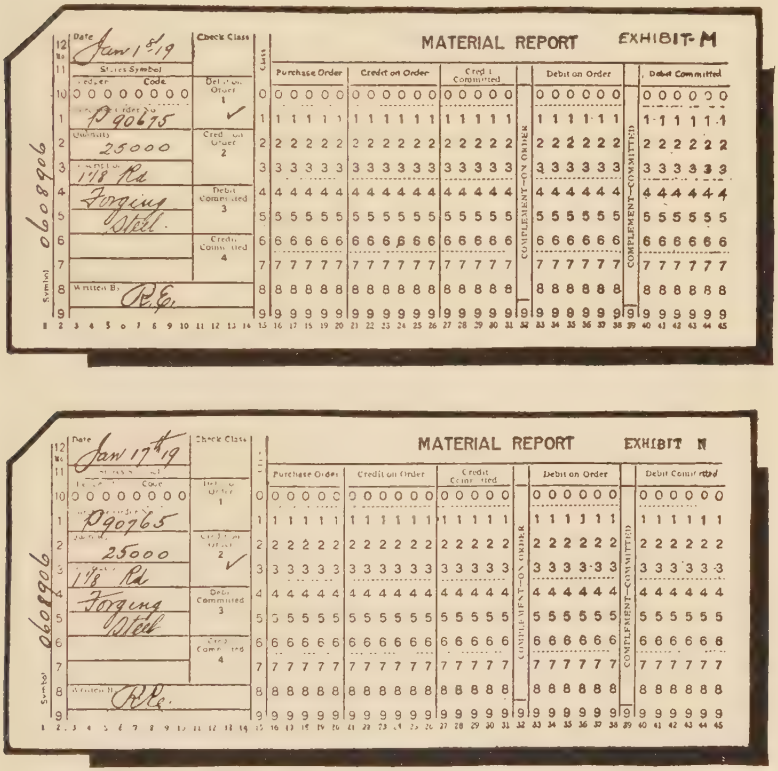


Figure 53. Tabulating Cards Used to Establish Debit and Credit of Materials on Order for Material Reports

quantity, and the complement of the quantity. By this means it is possible to ascertain at all times the balance on order of certain materials.

The stores cards, as explained under the perpetual inventory,

are used to give the balance on hand. Upon receipt of an order from a customer, a debit commitment card (Exhibit O, Figure 54) is punched for material required from information fur-

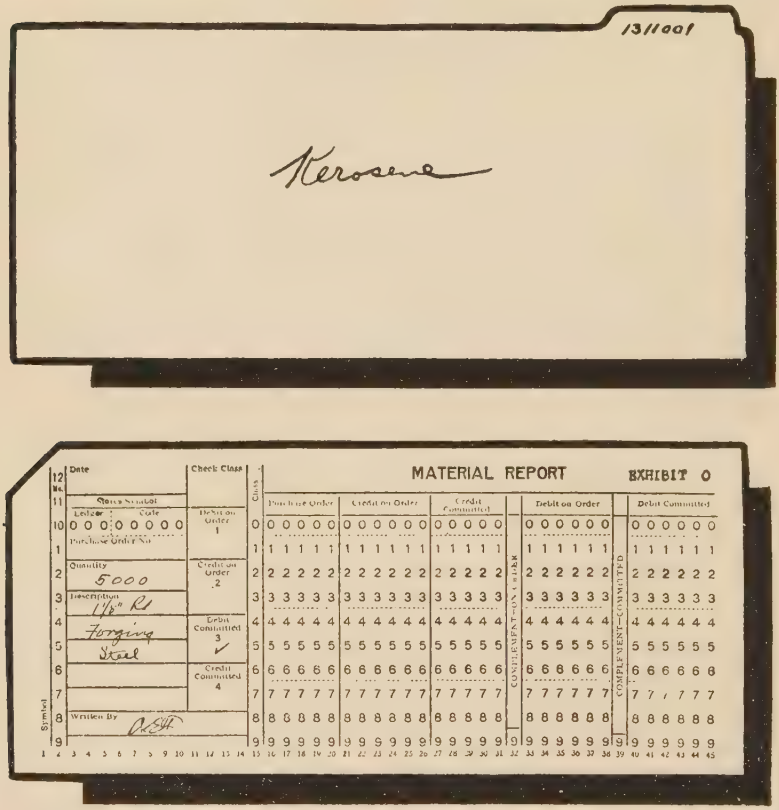


Figure 54. Index and Tabulating Cards. The latter card is used to establish debit amount for material commitment

nished by the production department. This card is punched to show symbol and quantity committed.

When material is delivered from stores to work in process, a credit commitment memorandum card (Exhibit P, Figure 55) is punched, showing symbol, amount committed, and the complement of the amount committed. A tabulation of debit

and credit commitment cards (Figure 55) establishes the balance committed at all times.

From the foregoing it is possible to secure a material available report (Exhibit Q, Figure 56), as the balance on order,

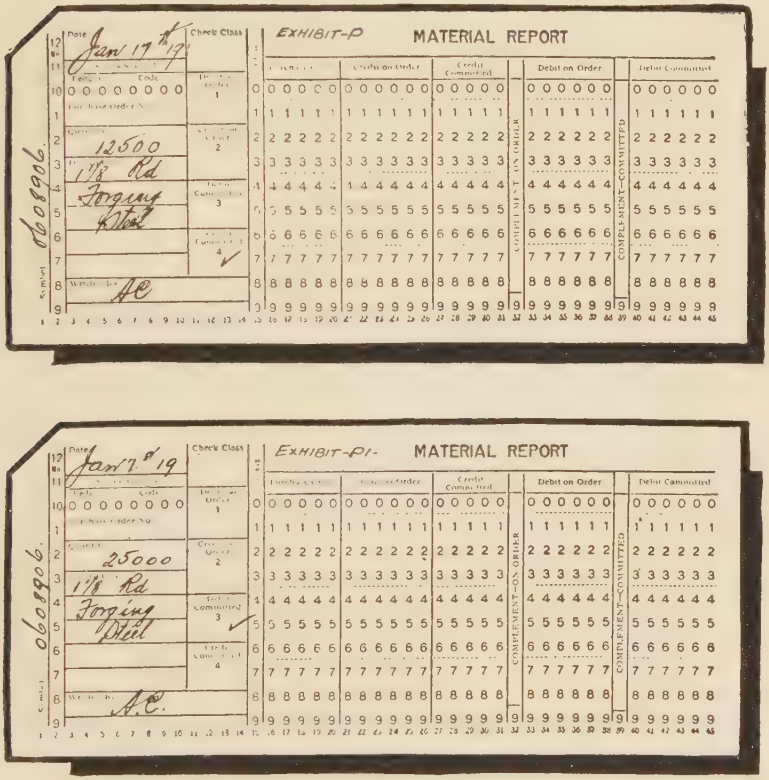


Figure 55. Debit and Credit Commitment Cards

plus the balance on hand, less the balance committed, gives the amount available. A record is maintained of the estimated quantities representing the figures the purchasing department have been governed by to cover anticipated needs. When desired, the tabulating department fills in the actual consumption, which gives a check on this point.

EXHIBIT-Q

MATERIAL AVAILABLE

SYMBOL AND DESCRIPTION	MAXIMUM AND MINIMUM	MONTHLY CONSUMPTION ESTIMATED	MONTHLY CONSUMPTION ACTUAL	DETAIL	PERIOD ENDING 7/2	PERIOD ENDING 7/9	PERIOD ENDING 7/16	PERIOD ENDING 7/23	PERIOD ENDING 7/31	PERIOD ENDING	PERIOD ENDING
0608906 1/8" Rd Forging Steel	MAX. 250,000	July 200,000 Aug.	196,000	On Order							
	MIN. 100,000			On Hand							
				Total							
				Committed							
				Available							
	MAX.			On Order							
				On Hand							
	MIN			Total							
				Committed							
				Available							
	MAX.			On Order							
				On Hand							
	MIN.			Total							

Figure 56. Material Available Report

Raw Stores Quantity and Values—General Considerations.—The machine method as applied to raw stores (quantity and value records) is comparatively easy, and the accounting proof is exceptionally sound. By referring to the illustration in Figure 57, it will be observed that the form consists of carrying a daily balance on both the value and quantity of a stores account. The ordinary form for value set-up provides columns for Old Balance, Received, Reference, Contra Account, Unit Price, Received, Disbursed, Balance, and then under quantity, Old Balance, Received, Disbursed, Balance and Symbol Number.

The maintenance of such a record makes available constant data on the value of the material in stores, a continuous control medium of cost accounting value. It is particularly of value in concerns where material in process is carried along in quantity and value lots from one department to another, or through the entire process of manufacture. Where this "in process" record is maintained, it is generally found desirable to control all movements of stores in and out of the raw material records.

From a machine operating and proof standpoint, this record is subject to two treatments:

1. Where the stores are withdrawn from the record at the exact price at which that particular quantity was charged to the record, and
2. Where all disbursements are made on an average price basis.

Where exact prices are used in disbursing stores, the ledger should be stuffed and predetermined totals taken of the posting media and the old balances before machine operation, if the highest efficiency is to be obtained. At the end of each run of postings, the proof sheet totals must, of course, check to the predetermined totals and cross-balances. Where average pricing is used in disbursing, the best operating method is to have a calculating machine operator take all receipt posting media, and go through the individual stores accounts to be affected

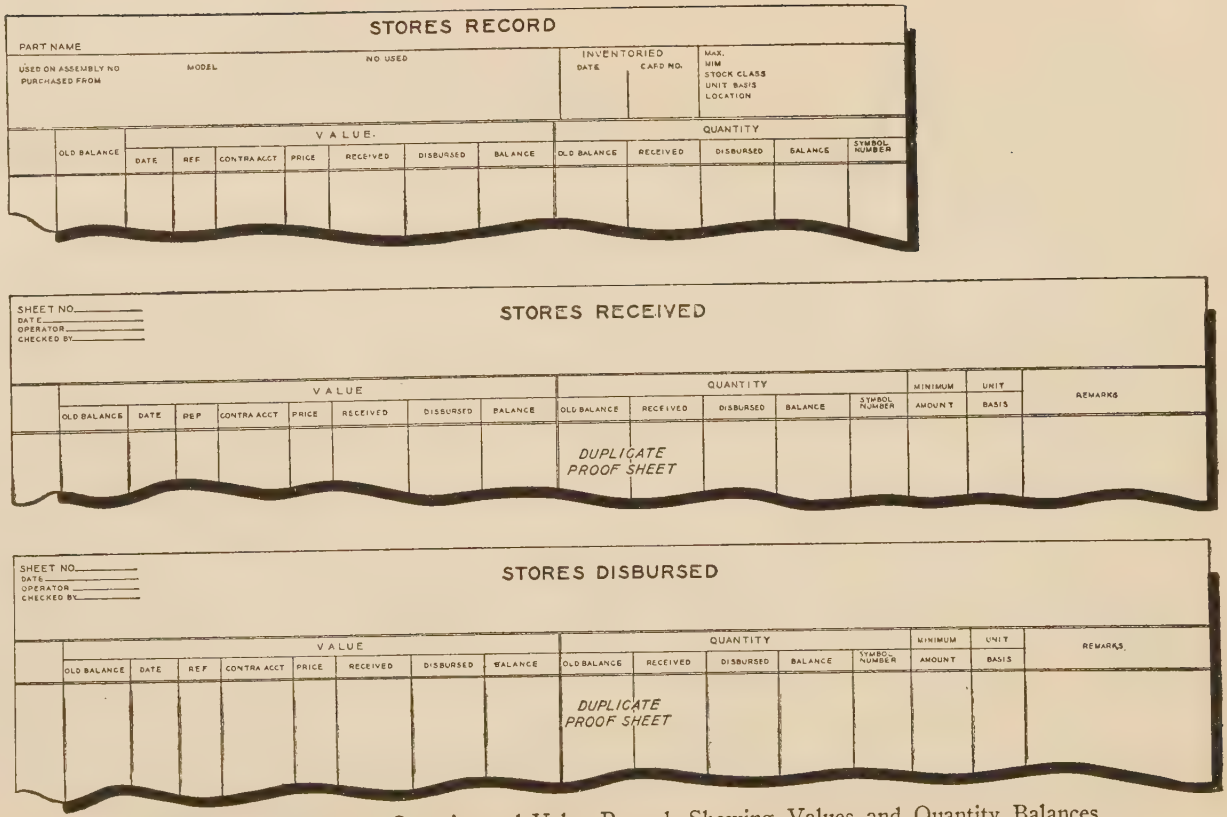


Figure 57. Raw Stores Quantity and Value Record, Showing Values and Quantity Balances with Average Unit Price

by those media and figure the new average price, including the receipt. This new average price may be entered in pencil in the Unit Price column of the record, and the posting medium is then attached to the ledger card. In this way all account cards affected by postings on the next run are located for the machine operators in the manner just described.

The machine operator follows the pricing clerk through the ledgers, "picking up" the old value balance, entering the date, receiving slip number, contra account, copying the new average price from the pencil figures indicated by the price clerk, the value of the receipt, and extends the new value balance. In a similar manner, the machine operator makes the proper entry affecting the quantity balance by entering the symbol or part number; returns the record card to its proper place in the file; and turns the posting medium face down in its proper order.

When the proof sheet to which the machine operator is posting is full, it is removed from the machine and dispatched to a control clerk with the posting media that form the basis for the entries thereon. This control clerk then proceeds to calculate each line entry on the proof sheet by multiplying the quantity balance by the average price shown thereon to see if the value balance agrees with the result so obtained. If this calculation proves each line entry to be correct, it establishes the fact that every figure entered in that line entry has been properly handled. It also proves the picking up of both "quantity and value" old balances; the correctness of the average price figure; the entry of the proper amount of value for the receipts; the entry of the proper quantity of receipts; and the extension of correct balances in both value and quantity. It is a very practical proof of correctness.

In cases where the values are small, or the fractions on average prices extend far into the decimals, there is a tendency toward a slight variation between answers to the proof calculation, and the calculation by which the average price was established. However, such differences do not materially alter the

value of the total results since the correctness of each line entry has been tested.

If the columns of the machined proof sheet are captioned similar to the one illustrated in Figure 57 so as to show minimum amount, unit price, and remarks, this record of all entries to the stores ledger can be made to serve several uses in most manufacturing concerns. Where the original proof sheet is intended to be held in the department for proof purposes alone, it is entirely feasible to make duplicate proof sheets. Disclosing as they do the actual physical balance opposite a specific minimum amount together with the unit price or kind of basis used —pounds, feet, inches, etc.—a duplicate of the proof sheet may be of exceptional value to the purchasing agent, production manager, or other executives who are vitally concerned.

The reader's attention is called to the fact that stores disbursed proof sheets on a quantity and value record of this type form the basis for positive checks to charges on cost records. Stores disbursed for a given department on the value side should be in agreement with the total of the debit column of the proof sheet used for charging material to costs. The only difference between the cost and stock records that can be permitted in final costing is that taken care of by the charge to scrap.

Although it is rarely possible because of debit and credit memorandums and adjustments that are delayed, under an ideal system the total of the Value Received column on a stores received proof sheet would be in agreement with the control for the amount of credit to vendors that is to be charged to raw stores.

Explanation of Orthodox Routine Under Punch Card Method.—The use of tabulating equipment to stores accounting has produced very desirable results. Machines employing the "punched card method," with the use of complements, automatically subtract credits and other deductions during tabulation, while accumulating or adding individual accounts. The

following outline will indicate the results that can be obtained through the use of such equipment and the economies that may be realized. The routine is somewhat as follows:

1. A balance card (Figure 58) is punched for each commodity carried in stock with the unit price and total value shown thereon.

2. When goods are received, a receipt card (Figure 58) is punched and filed behind the balance card for the corresponding

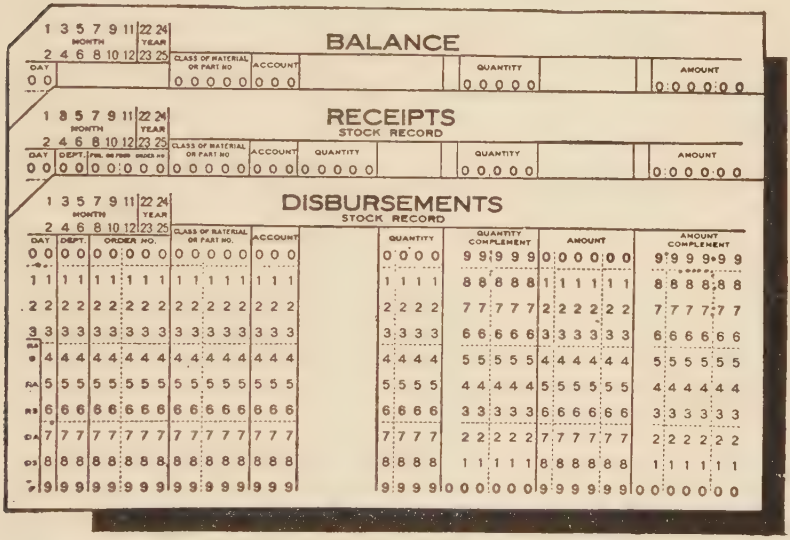


Figure 58. Balance, Receipts, and Disbursements Tabulating Card

kind of material. If the unit price varies from that indicated on the balance card, a new average unit price is computed and noted on that card replacing the former price appearing thereon. The returns to stock card (Figure 59) should be combined with the punching of the receipt cards. The returns to stock card may be used by the cost department for crediting cost originally charged for the value of material returned.

3. When material is requisitioned from stores, a dual card (Figure 60) is used as a requisition form, which is dispatched to the stores department where material is issued, after which the card

is returned to the accounting department where it is priced; the balance card and receipt cards covering the same material are removed from file at the time requisition card is priced. This

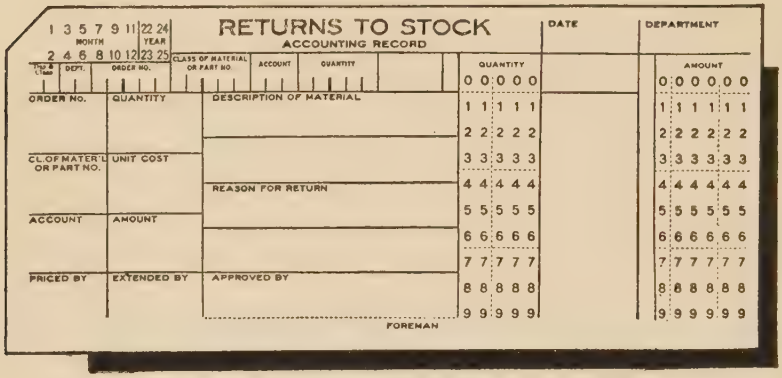


Figure 59. Tabulating Card—Returns to Stock

card may also be used by the cost department for setting up the cost of material against production orders.

4. The requisition card (Figure 60) is then punched in duplicate in regular manner; the dual card dispatched to the accounting

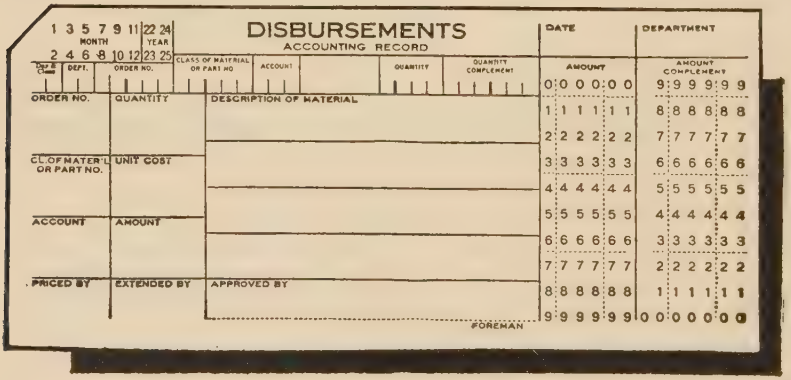


Figure 60. Disbursements Tabulating Card—Dual Form

department; and the stock record copy is retained and filed with the balance and receipt cards previously withdrawn from the file.

5. All cards which have been withdrawn from the file are then

tabulated, establishing the new balance quantity and value of material on hand. Both figures are obtained simultaneously.

6. The quantity and value of material on hand, together with the total receipts and disbursements are then transcribed direct to new balance card, which is then punched and filed, replacing former balance and receipt cards which have been previously tabulated.

7. All cards which were withdrawn are then filed in a transfer record file.

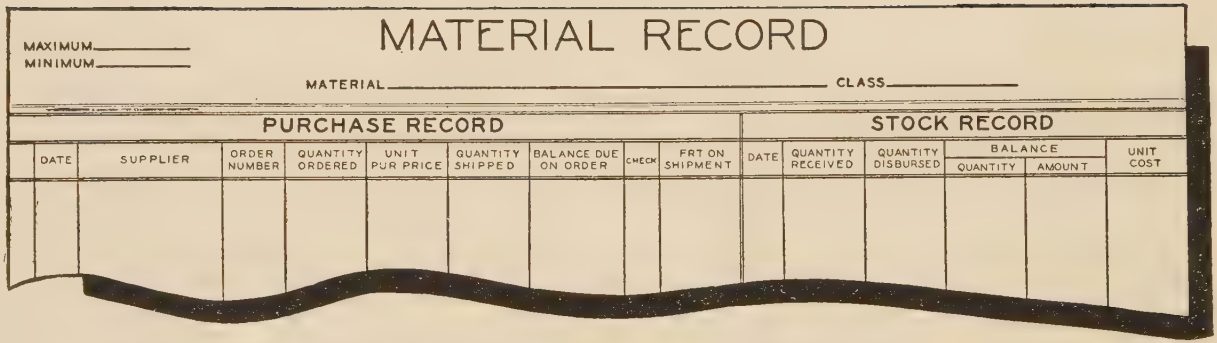
8. At the close of each month the active file of cards is tabulated onto material record (Figure 61) in order to obtain the value of material on hand. This tabulation may be divided into as many principal classes of material as desired.

The balance cards may be maintained—monthly, cumulatively or annually—their use being largely dependent upon the information desired:

1. If it is desired that the amount of receipts and disbursements for each class of material be obtained monthly, together with the balance of the quantity and value of material, an individual monthly balance card should be punched for each item of stock, and form the basis of the records for the following month.

2. Under the cumulative or annual balance card plan, a total, or summary tabulating card should be punched for such items of material which move freely. This total card should indicate the period the individual transactions cover. Total cards should only be used in such cases where there is a considerable accumulation of individual cards. The preparation and insertion of total or summary cards may be made at irregular intervals as conditions warrant, necessitating merely the tabulation of any group of receipt or disbursement cards recording such tabulations to total cards, respectively. The balance card which is prepared at the beginning of the year, is used continuously throughout the year. The tabulation of the balance card, total card for receipts and disbursements will establish the new balance of stores.

Under the monthly plan the transactions covering receipts and disbursements are closed out at the end of each month, and


MAXIMUM_____
MINIMUM_____

MATERIAL RECORD

MATERIAL_____ CLASS_____

PURCHASE RECORD										STOCK RECORD					
	DATE	SUPPLIER	ORDER NUMBER	QUANTITY ORDERED	UNIT PUR PRICE	QUANTITY SHIPPED	BALANCE DUE ON ORDER	CHECK	FRT ON SHIPMENT	DATE	QUANTITY RECEIVED	QUANTITY DISBURSED	BALANCE		UNIT COST
													QUANTITY	AMOUNT	

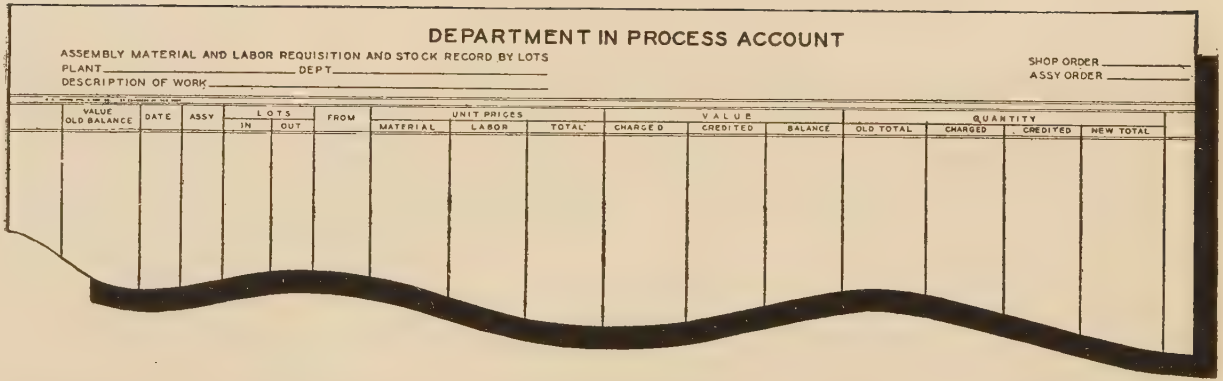
Figure 61. Material Record for Use on a Tabulating Machine Equipped with a Printing Mechanism

the balances for both quantity and value of material are secured and carried forward to the following month, whereas under the cumulative plan the receipts and disbursements are not closed out until the end of each year, but balances are available and can be secured at regular periods or whenever desired through the adoption of total cards previously referred to.

In Process Stores.—An in process stores record is essentially a cost record of all work in process in each department, to which inventory is added daily the value of all direct labor performed upon the material represented on the record. If complete on one record as shown in the illustration in Figure 62 it is necessarily a quantity and value record. In most forms it must be so kept as to show both material and labor unit prices, as well as the total of each.

Primarily the record is intended to show the quantity and value of a given store that is received from raw stores into the first department to be affected by manufacture, and then, when that department finishes its work, the record should show a credit to this department as the material leaves the department, and another record should show a charge for the same material as it is received in another department. In this manner one department is credited and another debited on the in process stores record until such time as the material actually leaves the floor of the plant in the form of finished product, or is charged to a class of stores known as semi-finished stores—those stores upon which part of the work of manufacture has been performed.

Since this is a cost record, the reader will observe that charges to this record for labor performed on given material must balance in dollars and cents to credits which are given employees in the payroll department for direct labor performed. There are three methods for the carrying of in process stores records. The first contemplates the combining of the values of direct material and direct labor into a total for the unit


DEPARTMENT IN PROCESS ACCOUNT

ASSEMBLY MATERIAL AND LABOR REQUISITION AND STOCK RECORD BY LOTS

PLANT _____ DEPT _____

DESCRIPTION OF WORK _____

SHOP ORDER _____

ASSY ORDER _____

	VALUE OLD BALANCE	DATE	ASSY	LOTS IN	LOTS OUT	FROM	UNIT PRICES MATERIAL	UNIT PRICES LABOR	UNIT PRICES TOTAL	VALUE CHARGED	VALUE CREDITED	VALUE BALANCE	QUANTITY OLD TOTAL	QUANTITY CHARGED	QUANTITY CREDITED	QUANTITY NEW TOTAL

Figure 62. Material In Process Inventory Record. This record should show material price, unit labor price, and combined unit labor and material price. It provides for the movement of material in lots, in and out of manufacturing departments

being costed and on the same record carrying the total quantity of that unit in process. The second method, as shown in the illustration in Figure 63, contemplates the carrying of the material on one record and accumulated labor on another. The third method, as shown in the illustration in Figure 64, accumulates direct labor, direct material, and burden amounts, as well as a quantity record by the units in process.

The form for the first of these in process stores records (Figure 62) shows on the value side, old balance, date, reference, lots in or out, to or from, unit price of material, labor total, received, disbursed, and balance. The quantity side shows old balance, received, disbursed, balance, and symbol number. To this record is applied the same method of preparation, operation, and proof as that described for the raw stores quantity and value record. Where this method of proof is used, the total unit price, which includes both material and labor, is the factor by which the quantity balance is multiplied to test the correctness of the answer against the value balance.

In all large plants and in hundreds of small ones, the cost analysis recognizes direct material and direct labor as two separate and distinct factors which must be handled separately until their final appearance in the analysis. Where this is done, the value of a correct unit price for material and for labor can readily be appreciated in handling this material on the cost records.

The Lot In or Out column in the illustration shown in Figure 62 represents a division or quantity of that particular store which has been arbitrarily established by the production department. This department may issue a general production order for the manufacture of any quantity of a given kind of finished product to be issued in separate lot orders for the same kind, with the result that the raw material will be withdrawn from stock in varied or specific quantities according to lots. These lots are traced through the in process stores records from one department to another until they have finally been

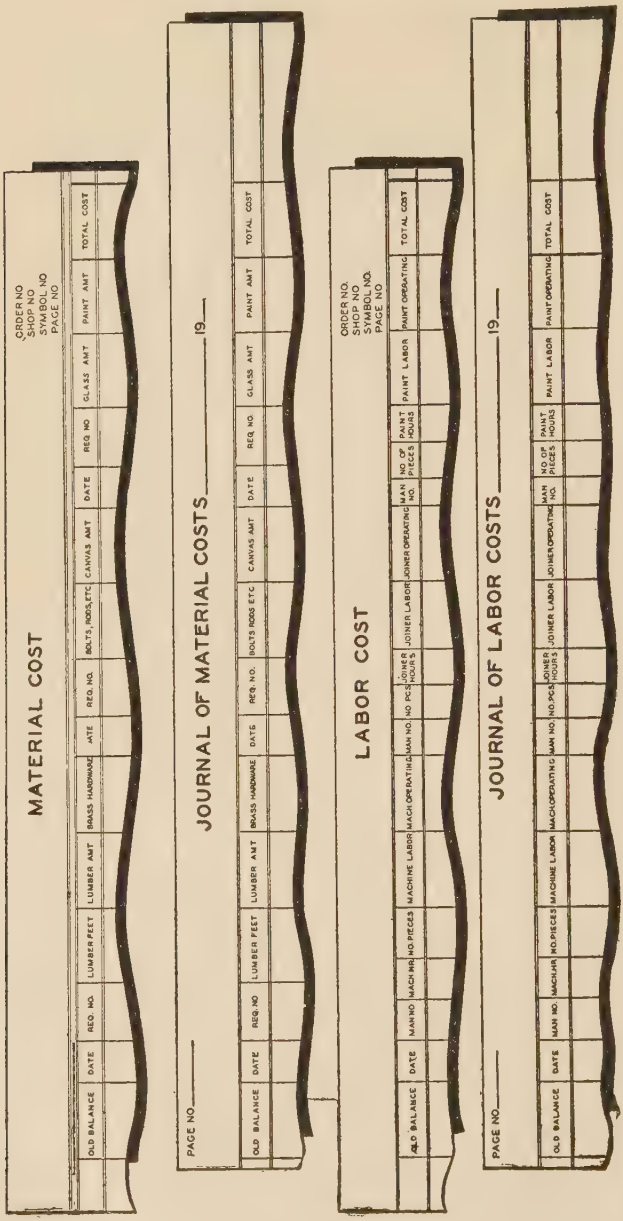


Figure 63. Material In Process Inventory Record—showing how cumulative productive material and labor costs are obtained by means of proof or register sheets

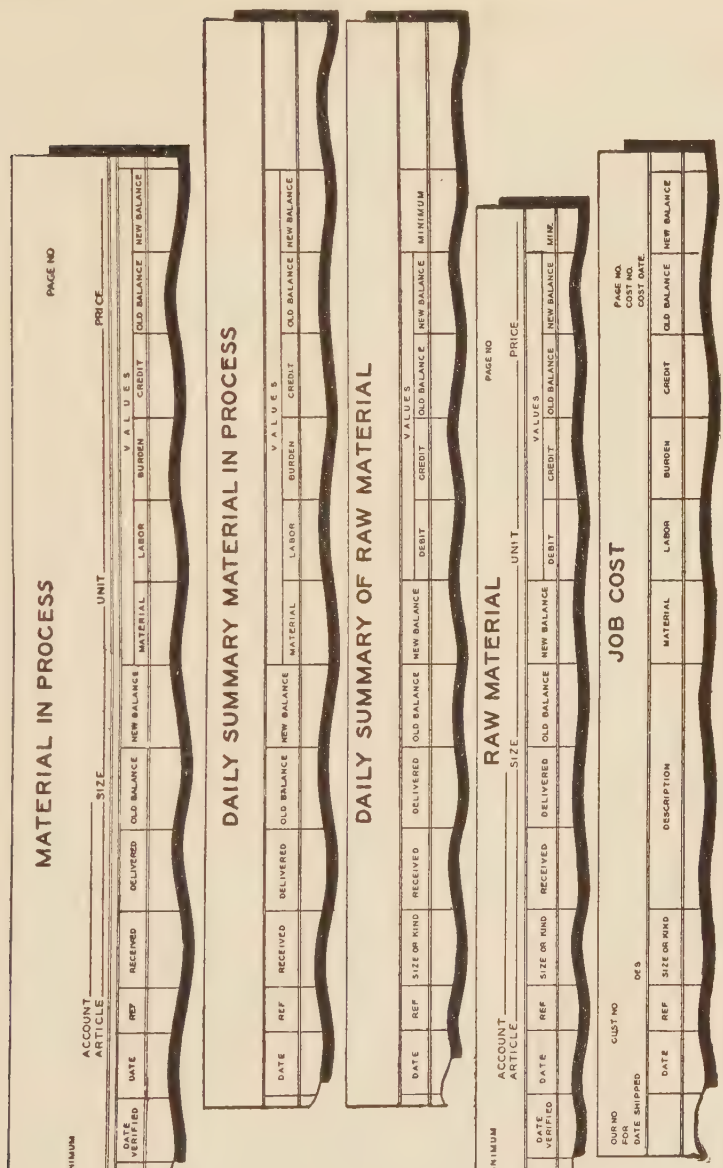


Figure 64. Material In Process Record. Should show quantity balance with accumulation of additional costs on material, labor and overhead

completed. The To or From column is to simplify such tracing for the production department. A particular lot will often be withdrawn from process, charged to raw stores, and finally sent back to the original vendor. Often during the course of manufacture a lot will be switched from the original production order intended and will be used for the completion of an entirely different production order. As in process stores record accounting is just as exact and subject to audit as any other record in an accounting department, the To or From column, which makes clear these movements of the lots, is as important as the use of the Contra column described in Chapter XI in discussing accounts payable.

Since this record shows the charge for direct labor performed upon direct material, the reader will recognize it as a cost record pure and simple. When kept in this manner, it is seldom kept alone, for it is controlled by a factory ledger or general accounts cost system, to which are directly charged the totals established by the payroll department, and the raw stores records. Such charges form the control against which the in process stores records plus the scrap reports must continuously prove.

Where material and labor accounts are kept separately, the material accounts may be carried on a lot check system, which automatically reports to the production manager the progress of given lots of material from department to department through the factory. These reports should show the position of lots in the factory, making it possible to take an actual inventory with accumulated value of labor by the relative position of the material to the complete course through which it has to pass. Of course, computations such as these must be accurately controlled by an analysis of the labor costs and must be supported by an adequate scrap reporting system.

Lot cards, in some instances, are supplanted by control boards. On these control boards are marked the stations through which material must travel as it progresses from raw

stores to the finished product. There is a production route on each board for each course of manufacture. At the beginning of this route, numbers show the quantity of raw stores still left in the storeroom, and each operation station on the route has a numerical tabulation, where the actual number of pieces that are at that particular operation are shown. Of course, the end of the route should show the number of finished product.

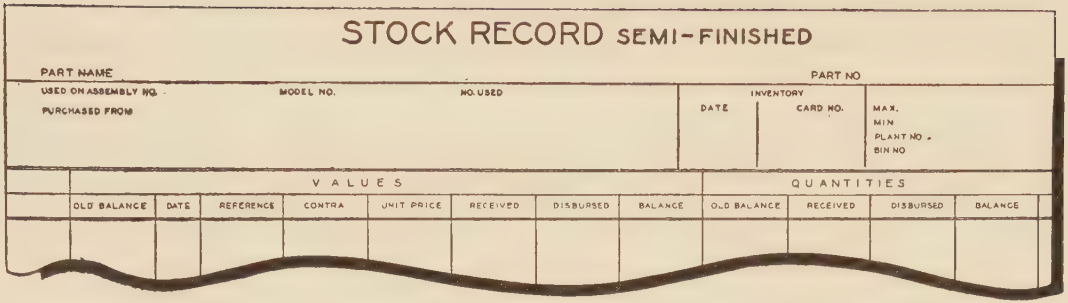
The form shown in Figure 64 also illustrates the third method of in process stores accounting. On this particular record the total of the units as shown in the balance column on the left side of the card divided into the value balance on the right side of the card, establishes the price per unit. No effort is made to dissect the cost per unit by material cost, labor cost, and burden, except at stated intervals when the figures entered in the value columns under these headings are analyzed.

Each day's charges in the material column, as shown on the proof sheet for each run of postings, must balance to the stores disbursed credits or to the credit to the previous department's in process account for that class of material. Labor charges in the labor column, as shown on the proof sheet for the department affected, must balance to the credit given in the payroll department to the employees for direct labor performed on this and other material in this department. The burden totals, as shown on the proof sheet, must prove to the burden total which has been predetermined for use in costing during the current period. Actual burden is simultaneously being accumulated on the expense or burden accounts independent of the material in process record illustrated.

It should be noted that when posting to the value side of this record, it is necessary to make all corrections in the column in which the error was made, either by additions or direct subtractions. The credit column has no value except in making credit entries to the balance, such entries embodying the proper amount of material, labor, and burden.

Semi-Finished Stores.—Probably the greatest variety of forms known to stores record systems is devoted to the keeping of semi-finished stores. In many instances a simple quantity record showing Old Balance, Debit, Credit, Balance, and Unit Price, is used, while in others, a quantity record showing Quantity on Hand, Quantity on Order, and Quantity Available, is used. In still another, a quantity and value record may carry a single unit price; or it may be a quantity and value record that will carry a Material Unit Price and a Labor Unit Price, together with a total of the two; or the record may take one of the three forms previously described as used in the in process stores accounting routine, illustrated in Figure 65. There is a natural aptitude on the part of constructive accountants to use for semi-finished stores the same class of record that is used either in maintaining in process stores or in the raw stores record. It has often been found that the accountant adopts a record for semi-finished stores simply because the same record is maintained in some other plant, instead of going into the matter of studying scientifically what form of record would best be adapted for keeping the semi-finished stores.

To be of the best service on the question of the kind of stores record to keep on semi-finished stores, the constructive accountant should consider what kind of a cost system is being maintained and what changes are or may be applicable thereto. When it has been determined how material and labor are to be recorded, whether separately or on a combined basis, and whether the cost system contemplates the maintenance of exact records through process on all articles of manufacture, the constructive accountant will then be able to select a form that will give exact information on semi-finished stores that will tie up exactly with the cost records. The point to remember is that stores coming out of process must go back into process on the same basis on which they came out, i.e., if an in process record is maintained which shows quantity and value, a unit labor price and unit material price, while this unit may be


STOCK RECORD SEMI-FINISHED

PART NAME

PART NO

USED ON ASSEMBLY NO.

MODEL NO.

NO. USED

PURCHASED FROM

INVENTORY

DATE

CARD NO.

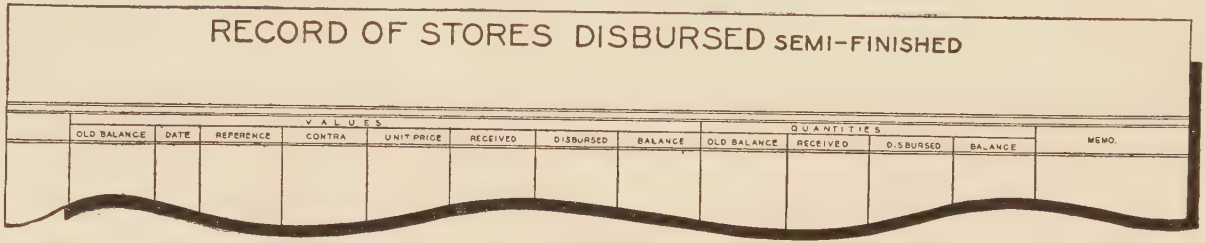
MAX.

MIN

PLANT NO.

BIN NO

	VALUES								QUANTITIES			
	OLD BALANCE	DATE	REFERENCE	CONTRA	UNIT PRICE	RECEIVED	DISBURSED	BALANCE	OLD BALANCE	RECEIVED	DISBURSED	BALANCE


RECORD OF STORES DISBURSED SEMI-FINISHED

	VALUES								QUANTITIES				
	OLD BALANCE	DATE	REFERENCE	CONTRA	UNIT PRICE	RECEIVED	DISBURSED	BALANCE	OLD BALANCE	RECEIVED	DISBURSED	BALANCE	MEMO.

Figure 65. Semi-Finished Stores Record. This record is suitable where definite record is required to be kept for each department, of quantity and value of material on an exact basis as work progresses

charged out to semi-finished stores at a total cost, it must go back into process on the basis of material value and labor value. The semi-finished stores record must be maintained so as to give these data.

Of course, it is not necessary to maintain each balance, such as material value and labor value balances on separate records or in separate columns. The total value of either accompanied by the unit material price and the unit labor price, will give sufficient information to determine the value of the two units on each record as they are delivered back into process.

Finished Stores—Completed Product.—A completed product stores record is an inventory record of all of the articles that have been manufactured and are still on hand and unsold. From a mechanical accounting standpoint, it is one of the simplest stores records maintained. Its main object is to inform the management of the quantity of finished product on hand, on a basis that will make it possible to interpret this quantity in dollars and cents for closing or operating statement and balance sheet purposes. Because of the necessity for this closing information, the record is often kept in such a way as to show the unit cost price per lot of finished product manufactured. However, in many cases, prices are averaged—the variations in cost being absorbed in a general average unit price which is applied to the entire lot or inventory balance.

The pricing method, whether exact price or average unit price is used, determines the only variation in the kind of form used on this record. In either case, the form illustrated in Figure 66a shows Old Balance, Debit or Received, Disbursed or Credit, and Balance. Where the exact price is used, the form may be designed so as to provide a column for Unit Price. Where an average price is used, the form may also provide a column for Unit Average Price. The main difference arises in the design of the form used. Where average pricing is used,

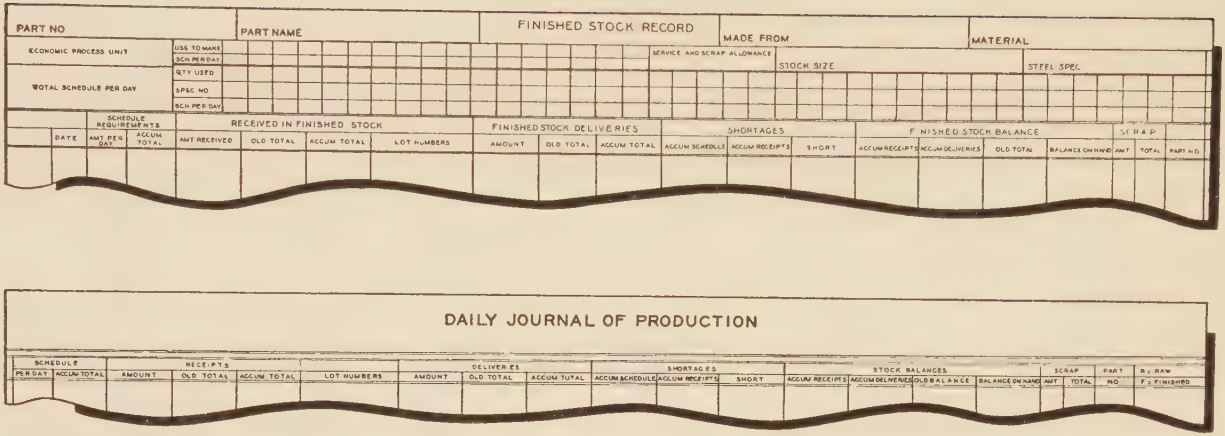


Figure 66a. Finished Stock Record—This Record may also be used as a cost summary on a given product

the blocks shown at the top of the form illustrated in Figure 66b should be sufficient. Where exact pricing is used, the form may be divided about midway. The top of the form is devoted to receipts, and the bottom to disbursements.

Under an average pricing system, the method is simply the entry of the receipts or disbursements, adding or subtracting them from the balance and extending a new balance after each entry. Under this method, it is customary to run through the ledger and figure the new average price after each receipt. In case the receipt comes in at a variation from the old average price, it means that a new price must be figured. Under an exact pricing system it is often found desirable to accumulate the receipts by the exact price, i.e., if one thousand articles are received at five cents each, they are accumulated into a balance of all articles that cost five cents each, in the receipts division of the card. One thousand other articles, which come in at ten cents each, are accumulated into a separate balance on the receipt division of the card. The one thousand at five cents each are then brought down to the lower part of the card, and disbursements are recorded against the same until the entire balance is wiped out. The balance shown on the receipts of ten-cent items are then brought down and disbursed until they are entirely disposed of. In this manner the balance by each exact price is wiped out in its proper order.

Under this method it is necessary that two entries be made wherever the disbursement amounts to more than the balance shown on the lower part of the card. It also means that the exact amount to wipe out this balance must be disbursed, and then the balance shown above at the next price to be brought down and the rest of the disbursement credited to it, at the new price. However, it takes less effort to make this double entry than it takes to figure a new average price whenever a receipt varies in price from the old average price shown on the record. Wholesale houses should find this record ideal. It

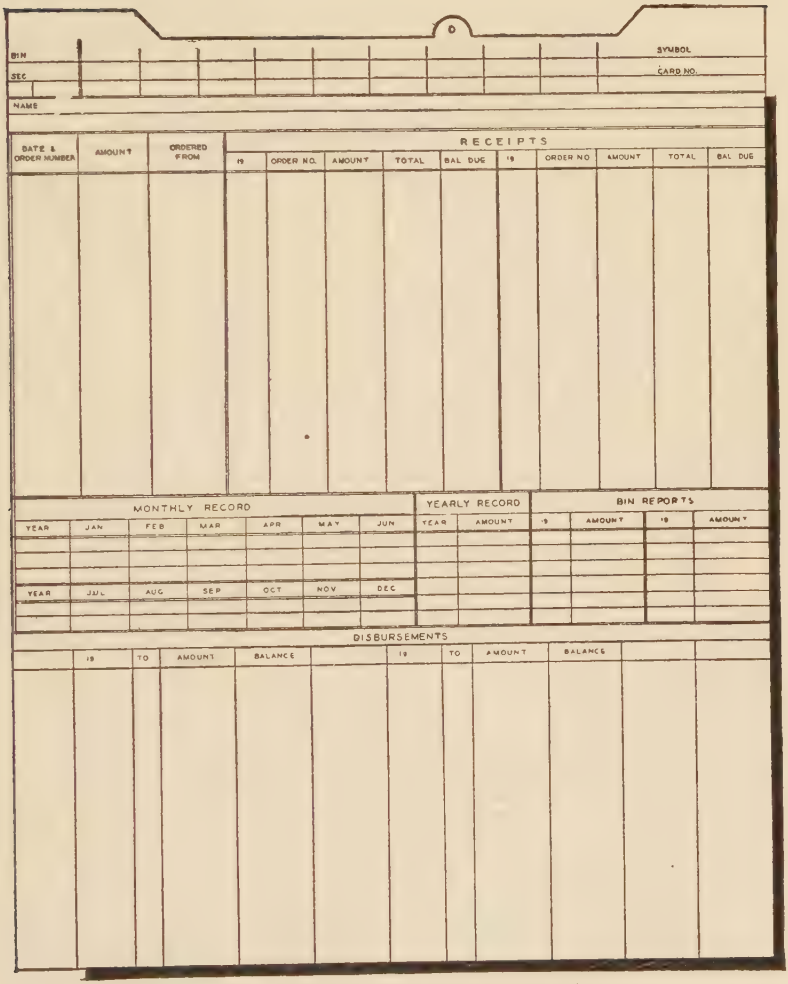


Figure 66b. Finish Stock Record

may also be used in public utility warehouse stores accounting. Wherever a simple quantity balance inventory record is desired, this type of record will be of value.

Retail Buying and Stock Control.—For retail establishments to purchase without reference to sales possibilities is suicidal, and the purchasing of more than can be disposed of at a profit, or less than is needed to meet the sales demand, are conditions which should be avoided. Underbuying means a loss of sales, and unless the customers' needs are met promptly in accordance with their orders, results in a loss in trade. Overbuying means the unnecessary tying up of capital in inventories, which increases the possibilities of loss resulting from changes in fashions and the level of prices. Manifestly the ideal situation, so far as the amount of stock to be carried is concerned, is one in which the least amount of capital is used to provide an adequate stock for meeting the requirements of customers, and in which the loss from unsalable merchandise is reduced to the lowest level.

Many stores fail to realize the amount of waste resulting from slow turnovers. The following factors, which are responsible for some of the losses incurred by most stores, are worthy of consideration.

1. The unnecessary use of capital in merchandise that could be more profitably employed in other productive sources.
2. The increased cost of borrowed capital, the carrying of larger stocks, and their slow turnover, necessitating the borrowing of larger amounts of capital for longer periods.
3. The marking down of the sale price due to the fact that the goods will not move at the higher sale price.
4. An increase in overhead expenses due to the larger storage and display equipment needed for goods, and to the costs incident to handling the larger stock and remarking the stock when it is necessary to lower sale prices.
5. The loss of prestige and reputation from carrying unstylish and shop-worn merchandise.

It is obvious that there is a very necessary relation between the buying policy of a store and its ability to finance purchases. Regardless of the fact that it may be possible to increase sales, unless the store is in a position to finance not only the additional credits extended to customers, and the additional purchases needed to take care of the increased sales, it is not feasible to pursue a policy of sales expansion and, therefore, of increased buying. It must be remembered that buying cannot be considered as a store activity by itself, but as one dependent upon the sales activities and the financial position of the store.

The Relationship of Purchases to Sales Requirements.—We must bear in mind that successful buying rests on a knowledge of two things: first, when to buy, and second, what to buy. The timeliness of buying has a closer relationship to sales requirements than the market possibilities of purchases. Goods are bought for the purpose of satisfying needs of customers, and a knowledge of the trend of the market is necessary; but buying in accordance with market trends too often leads to speculation in merchandise where due consideration is not given to the sales requirements. A knowledge of the specific merchandise needed to satisfy the requirements of customers is equally important. The regular use of the "want slips" of customers calling for goods not in stock is one source of information. The records of the paid "shoppers" as to the commodities and prices of competitors is also a source of information which buyers put to good use.

Importance of Establishing Sales Quotas.—In endeavoring to answer both these questions, when to buy and what to buy, the records of the store itself should certainly furnish the fundamental information needed to secure a proper control of the movement of merchandise, which means that a system of perpetual inventory is quite indispensable. In department store activities, the beginning of merchandise control is the fixing of a sales quota, that is, the making of an estimate of

sales for a future period. Without a definite goal to be striven for, control is impossible, and it must be borne in mind that buying and finance are dependent on it. A knowledge of inventories at any time is needed to determine the buying requirements. In the small store such inventory can at least be estimated on the basis of past performance as to percentage of gross profit, and, therefore, the percentage of cost of goods sold. The application of this percentage of cost of goods sold to the sales for the period determines the cost of goods sold, which, subtracted from the beginning inventory plus merchandise purchased, gives an estimate of the merchandise in stock. A perpetual inventory kept by quantities rather than by values serves the purpose in many stores. What is commonly known as the "retail system," by means of which the value of the stock on hand can be estimated at any time, is used in many large stores, and in conjunction with such a system the use of the commodity control record or classification as featured in this text gives a sure index of the conditions of merchandise and the movement of such merchandise at any time.

Retail Method of Evaluating Merchandise.—The use of the retail method requires a stock record from which the goods on hand as valued at selling prices can be determined almost instantly, and from which the per cent of mark-up and mark-down can also be determined. In principle the method is extremely simple, although in practice it must be operated very carefully, else unreliable data will result. It very seldom happens that merchandise will move at the original marked sale prices. Adjustments are frequently necessary. On an upward market, perhaps, a higher price can be procured than the marked price, whereas on a downward market, or in order to move certain merchandise, it is necessary to mark down from the original sale price. The fluctuations arising from mark-ups and mark-downs will not be discussed in this text, although some applications of interest will be explained.

Why Proper Accounting Control Is Essential.—The chief purpose of the accounting records kept in the store is the securing of control over the activities of the store. The control over merchandise must always be based on records. Therefore, the first step in securing the necessary control is a proper departmentalization of merchandise. Analysis of purchases and sales by departments is also fundamental. In addition, a knowledge of what others are doing serves as a criterion by which to judge one's own results.

Three major problems from the buyer's standpoint must always be met; and it must be remembered that they are not independent problems but, as indicated above, are intimately related to selling and financial policies. These policies are:

1. The determination of the average stock to be carried.
2. The determination of the buying quota for a given period.
3. The determination of the "open-to-buy" amount at a given time.

Too often these matters are decided in a haphazard fashion. Only by means of a careful analysis of all factors, and the results obtained in the various departments as compared with average or standard results, can a sound basis of stock control be secured.

Determining Stock Requirements.—Therefore, stock control rests, in the first place, on estimated requirements for the future, and such estimates must always be based on past performance, as modified by present market conditions, and contemplated changes in basic merchandise policies. In estimating the amount of stock to be carried, the volume of expected sales must be taken into account. The other factor to be considered is the rate at which the merchandise should turn during the period. Hence, if estimates are made for a period of six months, the estimated sales for that period divided by the number of times the stock is expected to turn during such period will give the average amount of stock to be kept on

hand. In determining the changes from average stocks to be carried at particular times during the period, seasonal fluctuations must be given consideration. To illustrate, if the estimated sales in a given department are $40,000 for a six-month period, and the merchandise turnover is four times during that time, manifestly a stock of $10,000 as priced at retail must be carried. If the mark-on is 50%, the cost of the average stock will be 50% of $10,000, or $5,000, representing the average capital to be tied up in merchandise for that department.

Determining Buying Quotas.—In determining a buying quota for a given period, one must take into consideration the stock on hand at the beginning of the period, the stock which it is planned to have on hand at the end of the period, and the estimated sales for that period. If, from the sum of the stock planned to be on hand at the end of the period, and the sales estimate for the period is subtracted the stock on hand at the beginning of the period, the buying quota for the period is determined. This buying quota is, of course, figured at retail price and must be reduced to a cost basis by use of the mark-on percentage. The example below will illustrate the method.

Stock planned to be on hand at end of period	$10,000
Estimated sales for period	40,000
	$50,000
Stock on hand at beginning of period	6,000
Buying quota at retail price	$44,000

Mark-on is 50%, i.e., cost is 50% of selling price, therefore $22,000 equals buying quota at cost.

The buying quota is always estimated at the beginning of the period. At various times throughout that period, if the stock is to be properly controlled it is quite essential to know how much of the buying quota is available. This is so, because estimates made at the beginning of the period never quite coincide with the facts of actual performance, and it is

very often necessary to take cognizance of these data of performance in determining the amount of stock to be bought at a given time.

Determining "Open to Buy" Position.—The difference between the estimated sales for the period and the actual sales to date is the estimated sales to be made during the remainder of the period. If from the inventory at a given date is subtracted the estimated sales for the rest of the period, the difference so obtained will represent the estimated stock remaining on hand at the end of the period, providing no more purchases are made. If such amount is less than the amount of stock originally planned to be on hand at the end of the period, the department is "open to buy" to the amount of the difference. If, again, the estimated inventories at the end of the period are more than the planned inventories for the end of the period, no additional stock should be purchased, except to replenish certain stocks which have become depleted, and which it is necessary to maintain to meet the needs of customers. In figuring the stock on hand at a given time, consideration must be taken of stock in warehouses, in transit, and on order. A typical "open to buy" analysis is shown below.

Stock on hand today in store		$ 50,000
Stock in warehouse		20,000
Stock in transit		15,000
Stock ordered (to be received before end of period)		30,000
Total Available Stock		$115,000
Sales planned for period	$200,000	
Sales made to date	100,000	
Estimated Sales for balance of period		$100,000
Estimated stock at end of period		15,000
Planned stock at end of period		25,000
Open to buy amount		$ 10,000

This open to buy figure should be amended in the light of experience with regard to the way in which actual sales are moving as compared with the estimated sales. If it is apparent that the sales are moving ahead of the estimates, the sales quota should be increased accordingly, which will in turn increase the open to buy balances. A similar adjustment should be made in the event that actual sales are not keeping pace with the estimated quotas first established.

It should be borne in mind that the problem of stock control is not solved by a maintenance of buying quotas and limits. The movement of individual commodities must be watched very closely. The tying up of capital in a large stock of slow moving merchandise may soon use up the buying quota needed for commodities that have the tendency of moving faster.

The development of more scientific practices in retailing demands an analysis of the activities of individual departments. The loss in one department should not be counteracted by the gain in another. Each buyer should be expected to show healthy conditions in his particular merchandise section, and the department should become a unit of comparison, rather than the store in general.

The Facts Departmental Statements Should Show.—The preparation of departmental statements, while effective in developing departmental autonomous responsibility, should portray to the management a proper knowledge of the effectiveness of internal operation. Such statements should be sufficiently detailed to show weaknesses in stock stabilization and bring to light all the most profitable price lines. To have an authenticated basis for future purchase policies of the various types of merchandise, the buyer must have knowledge of the relation of sale to stock of merchandise in his particular section.

The adoption of a system that will permit the subdivision of each department into natural divisions of merchandise by

classes, each of which are to be considered as independent entities in the computation of a buyer's accomplishments, will afford:

1. Knowledge of where the bulk of sales has evolved.
2. What price lines are selling satisfactorily.
3. Where stock turnover ratios were maintained at desired standards.
4. What merchandise produced a profit that is considered adequate.

A study of stocks, sales, mark-up, mark-down, gross profit, and merchandise profit for each classification would definitely show what class of merchandise was most profitable, and those which are not producing satisfactory returns. A further study will also disclose miscalculations in purchasing tendencies of certain price lines. All of this information also serves as an excellent guide to future operations.

Method of Control through Departmental Stock Classifications.—In retail organizations maintaining two or more stores, it is necessary that the same system of classification be maintained throughout; otherwise comparisons of departmental figures by stores are valueless where the elements of the respective departments are not the same. Inter-store comparisons of departmental divisions produce very effective results. Where a specific department carries merchandise of practically the same quality and the same prices in two stores with a difference in gross profit or volume, an investigation by classification might show that the stocks in several classes of merchandise are too high for the volume of business made by that department in one of the two stores, or it might prove that the department is operating below the general standard of efficiency established, and the activities of one of the stores are better than a reasonable average.

Under the routine being discussed, all departments should be classified by major divisions only, the standardization being

the same for all stores for merchandise of the same general character. The subdivision of these major groupings should be arranged in accordance with conditions peculiar to each store. There is thus a flexibility within the major classification which provides for further groupings due to particular store requirements. For example, Store No. 1 may divide a certain class of merchandise as applicable under the major division of a specific department. It might be that Store No. 2, subdividing a major classification, would be receiving sufficient business in a certain class of merchandise to warrant a separate sub-classification number. For instance, under the major classification of silks and velvets the following would be maintained throughout all stores, with the exception of Store No. 3, whose business in plain foulard is sufficient to warrant a separate sub-classification.

Major Classification—Silks and Velvets

1. White Silks
   - 101 White satins, all plain included, baronet and sport satins, wash satins, and messaline.
   - 102 Crepes, crepe de chine, canton, frost, crepe satin, meteor, moon glo, roshanara.
2. Black Silks
   - 201 Black satin, all plain included, baronet and sport satins, plain foulard.
   - 202 Crepes, crepe de chine, canton, frost, crepe satin, meteor, flat crepe, charmeuse.
   - 203 Plain foulard (applicable to Store No. 3).

Since Store No. 3 is interested in the result of plain foulard, this is given a separate sub-classification number where the results obtained are for plain foulard alone.

It should be remembered that where merchandise in a major classification is carried in one department and is sorted by classification, much care should be exercised in determining the principal grouping so that similar merchandise may have the same number in all stores without regard to the depart-

ment in which it may be carried. Changes in classification designations, and additions to accepted standardized groupings should not be permitted by individual stores without being authorized to do so by the proper authority.

Classification Report Explained.—The classification report illustrated in Figure 67 is an ideal statement that affords a practical basis of comparison of conditions for departments in the stores. All items in columns 2, 3, 4, 5, 7, 10, and 12 are the accumulations of original entries by classification as punched, distributed, and tabulated by mechanical accounting equipment. The following is an explantion of information listed under the headings of the classification report for buyers' use:

Column 1 should show the period classification mark-on as of the date the new classification record begins. In the event that the period mark-on per cent does not begin at the date the new classification record begins, the mark-on per cent for the present season should be used (see column 6).

Column 2 establishes the beginning physical inventory by classification.

Column 3 is the same as column 2, except that the figures of the ending physical inventory by classification are used instead of those at the beginning.

Column 4 establishes the season's net purchases at cost by classification. By this is meant from beginning physical inventory to ending physical inventory. These figures should include freight, net bill discount, transfers, and such other items which make up the total cost.

Column 5 is the retail price on all merchandise purchases which are entered in column 4.

Column 6. In this column should be entered the percentage of mark-on arrived at by using the figures in columns 4 and 5.

Column 7 embodies reductions taken on merchandise only.

Column 8 embodies sample reductions, discounts at retail allowed employees, dressmakers, purchasing agents, etc. This dis-

CLASSIFICATION REPORT

DEPARTMENT

CLASS NO	CLASSIFICATION	BEGINNING OF MONTH MARK-ON PERCENTAGE	BEGINNING INVENTORY AT RETAIL	ENDING INVENTORY AT RETAIL	PURCHASES AT COST	PURCHASES AT RETAIL	PERCENTAGE OF MARK-ON FOR THE MONTH'S PURCHASES	MERCHANDISE REDUCTIONS RETAIL	REDUCTIONS ON SAMPLES AND SUPPLIES AT RETAIL	REDUCTIONS ON SALES AT RETAIL	TOTAL REDUCTIONS AT RETAIL	PERCENTAGE OF TOTAL REDUCTIONS	NET SALES	GROSS PROFITS	PERCENTAGE MARK-ON GROSS PROFITS	RETAIL TURN-OVER
		ONE	TWO	THREE	FOUR	FIVE	SIX	SEVEN	EIGHT	NINE	TEN	ELEVEN	TWELVE	THIRTEEN	FOURTEEN	FIFTEEN

Figure 67. Classification Report

count should be prorated on a sales basis over the various classifications.

Column 9 embodies stock shrinkage at inventory time at retail, which should be prorated on a sales basis over the various classifications.

Column 10 is the combined totals of columns 7, 8, and 9.

Column 11. In this column should be entered the percentage of total reductions which is obtained by dividing column 10 by column 12. This figure represents retail inventory at beginning, plus purchases at retail, minus retail inventory at end, and all reductions.

Column 12. Net sales.

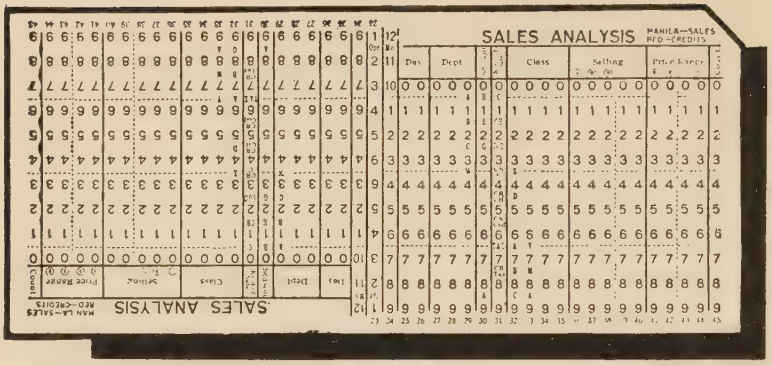
Column 13. Here is entered the gross profit or maintained profit in dollars earned by the various classifications.

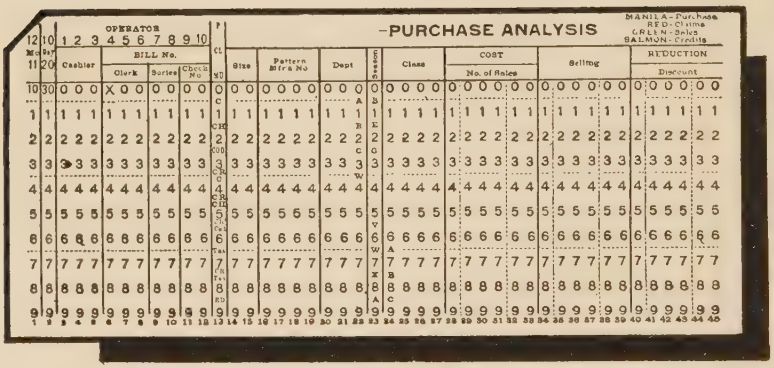
Column 14. Here is entered the percentage of gross profit, or in other words, the maintained gross profit per cent.

Column 15. Figures in this column are obtained by adding inventory at retail at the beginning and ending and dividing by two. The result so established divided into the net sales at retail is the turnover.

Routine Involved in Connection with the Preparation of Classification Report.—The tabulation of purchases and returns is performed as follows. Invoices which have been released by the bookkeeping division are dispatched to the tabulating division. These invoices should bear the classification symbol of the merchandise, placed there by the buyer at the time the invoice is figured at the retail price. A number representing the manufacturer's designation should then be noted on the invoice. A tabulation card (Figure 68) is then punched for each specific item appearing on the invoice. When cards have been punched they are filed by invoice number until the close of the month.

Returns to manufacturers require a similar operation, excepting that claim number is designated instead of purchase order number. The cost and retail figures are punched on a complementary card (Figure 68), so that subtraction will be tabulated by means of addition on the tabulating machine.





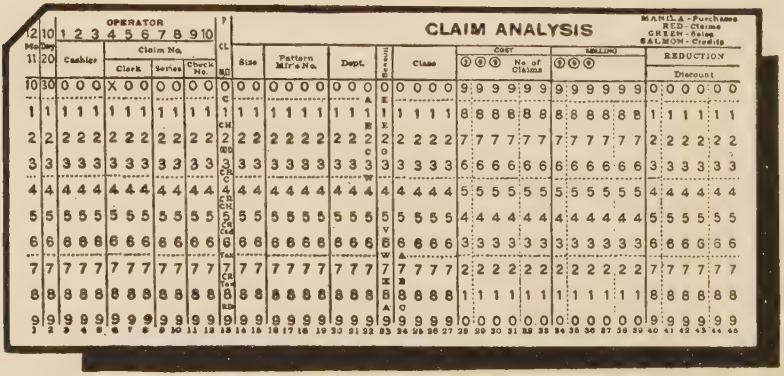


Figure 68. Tabulating Cards Used for Purchase Analysis, Sales Analysis, and Claims Analysis

Mark-on cards are prepared in the same manner. The date, department, manufacturer's number, classification, and amount of reduction are punched on the card. At the close of the month each set of cards, as shown in Figure 68, for the purchase, return to vendor, and reduction, are combined by departments and classifications through a sorting operation. All cards having been previously tabulated to prove against journal entries by departments affecting general ledger controls for proof. Each department is then tabulated by classification, the tabulation showing the sub-totals by classification and the grand total for the whole department.

Sales and credits are analyzed in the same manner. The classification number on the price ticket is copied on the sales ticket by the sales clerk. When sales tickets are received in the auditing division for audit, they are dispatched to the tabulating division for tabulation. The cards, illustrated in Figure 68, record the following information: day of month, kind of sale, classification, department number, amount of sale, price range, and account. They are tabulated for department totals daily, and are checked with audit sheets as prepared in the auditing division. Cards are then sorted by classification numbers and tabulated for daily and accumulated monthly reports previously referred to.

Method of Controlling the Accuracy of Recording.—A card is made out for each error under given classifications by department and clerk. Late cards are also made for department and clerk. These cards are sorted by departments and the number of errors and latenesses are listed against the clerk responsible for them. These data are entered on personnel rating records maintained for the purpose of ascertaining the accuracy and efficiency of each clerk.

Tabulation Symbols Explained.—The tabulating cards illustrate the facility with which the data punched thereon may be made to form the basis of a scientific stock and buying

control. The symbols in column 13 of the claim analysis and purchase analysis card are as follows:

P	Purchases
MU	Mark-Ups
CL	Claims
C	Cash
CH	Charge
COD	Cash on Delivery
CR	Credit
TAX	Sales Tax
RD	Reductions

To maintain control over the movement of individual commodities, as outlined in the foregoing, will be found to be of great value. It is not the purpose, however, to attempt to describe specific methods adaptable to all situations, but only to discuss basic principles as an aid to the constructive accountant, and to illustrate the methods of mechanical accounting found applicable to modern business conditions and requirements.

CHAPTER XIV.

THE PAYROLL AND ITS DISTRIBUTION

Importance of Maintaining a Proper Pay System.—In a manufacturing business the factory wage and bonus rate may be properly set, but if the pay system and its supporting operative accounting routine methods are not properly and scientifically installed, the working force will not become imbued with a sense of mutual responsibility, nor will the management be brought to a keen realization of its own responsibility for the cooperative administration of the plant. Unless these interlocking responsibilities are fully realized, effective results cannot be attained. The maintenance of a proper pay system, supported by scientific methods of accounting, therefore, becomes a matter of considerable importance, and it is the realization of this factor that is distinctive and characteristic of the principles of scientific management.

Experience has taught many managing executives that one of the greatest instruments of management is contentment of the entire working force. In view of this fact, the method of accounting for and the payment of wages should be very close to the heart of the management in every business, for it touches the vital relations of employees to employers, and through them the feelings and entire attitude of the men to the management. Loyalty and cooperation depend upon other things than only the worker's wage, and it is no exaggeration to state that the payroll system is one of the important factors that enter into the relations between the management and the personnel.

The method employed for paying wages is of the utmost consequence for it is the most tangible and self-evident point

of contact. It is less difficult to recover from an error of judgment in the personal approach to an employee than it is from an error committed in the payment of his wages. An apology will very often take care of an abrupt attitude, but not of a shortage in pay.

Demands of Modern Payroll Systems.—In large organizations the payroll system under pen methods has become almost universally regarded as not being able to keep pace with the ever-increasing demands made by the unfailing regularity of the payroll itself. The mandatory tasks placed upon the payroll routine by government taxation and compensation insurance requirements need only be considered to prove the seriousness of a payroll accounting condition. It would appear then that these demands alone should be sufficient cause to give constructive consideration to this phase of accounting, but unfortunately, it is very seldom and even remotely approached, and too often regarded as not an important enough function. Not until it is recognized that the work in connection with the payroll is being performed at the expense of other important accounting routine duties, generally creating an unsatisfactory condition, will the demands referred to give impetus to research and investigation for more precise methods of payroll accounting equipment. When such pressure is brought to bear, and the conditions are given serious constructive consideration, it has been found that the operative accounting methods usually recommended contain features of inestimable worth for the economical and speedy preparation of accurate payroll records, which finally prove entirely satisfactory to the management and the personnel.

Payroll System Surveys and Routine Analysis.—The most difficult as well as the most important problem that faces one engaged in payroll system surveys is the task of analyzing routine essentials for possible machine application. With a view of aiding persons engaged in such work, the following

queries are presented and recommended to be included as part of the survey. If answers to these questions are equitably substantiated, the examiner should be able to suggest improvements in existing routine that will produce highly effective results.

I. Relating to Time Recording, Payroll, and Payment:

1. Ascertain the form in which the payroll or timekeeping department provides the cost division with labor charges to cost units.
   (a) Time slip for each man for each cost unit affected?
   (b) Daily time card for each man showing time spent on cost units affected?
   (c) Daily summary showing total labor charge to each cost unit?
   (d) Other methods?
2. Ascertain whether the total payroll according to the payroll or timekeeping department is checked with total labor distributed to costs.
   (a) If so, when, and by whom?
3. How many male and female employees are there in factory?
   (a) Piecework.
   (b) Daywork.
   (c) Combination piecework and daywork.
   (d) Other.
4. What are the pay periods?
5. Ascertain manner in which payroll is paid.
   (a) Cash?
   (b) Check?
   (c) Is envelope used?
   (d) Is receipt required?
   (e) What are other requirements?
6. Obtain method in use of paying bonus, premium, overtime, etc.
   (a) Average total per day period.
7. What deductions are made from payroll?
   (a) In what manner?
   (b) When?
   (c) Average total per day period.
8. Ascertain in what form data described in 6 and 7 are given to the payroll department.

9. Obtain method by which employees' earnings records are kept for governmental report purposes.
10. Is a statement of earnings given to the employees each day period?
11. Obtain the relation between timekeeping and payroll departments.
12. Ascertain the form in which attendance and production records reach the timekeeping department.
13. Where and how are piecework earnings computed?
14. Is time figured in tenths of hours?
    (a) If not, how is it figured?
15. Obtain particulars regarding form in which present payroll is kept.
    (a) Loose leaf.
    (b) Bound book.
    (c) If kept loose leaf, would extra copies prove desirable?
16. Are machines used in any part of the payroll work?
    (a) If so, ascertain make and type of equipment used, and the nature of the work to which such equipment is applied.
17. Ascertain whether combining of payroll forms to be written by certain types of mechanical accounting equipment would be desirable.
    (a) What saving would be effected?
18. How is productive labor charged?
    (a) Operations?
    (b) Processes?
    (c) Jobs?
    (d) Machine units?
    (e) Production units?
    (f) Departments?
    (g) Other?
19. How is non-productive or indirect labor charged?
20. Ascertain number of people employed in payroll and timekeeping routines.
    (a) Number of male or female.
    (b) Total number of hours per day devoted by each.
    (c) Total salaries paid.
21. Obtain copies of forms and records used with complete entries.
22. Note any additional information that may prove helpful.

II. Relating to Method of Obtaining Labor Cost:

1. Ascertain whether the same time card is used for cost and payroll purposes.
   (a) If not, what is the payroll medium?
2. Ascertain if a cost time card or sheet is prepared daily showing distribution of employee's time.
   (a) If so, how many copies are made, and how are they used?
3. Determine whether cost time card is used for a job or operation card and changed for each job or operation.
   (a) If so, what are the average number of jobs per employee per day?
   (b) How many copies are made?
   (c) Do such cards indicate when a job or lot is finished?
   (d) If not, how is it known when cost unit can be closed out?
   (e) Who extends labor costs on the cost time cards or sheets?
   (f) When and where?
   (g) When are they available for posting to cost records?
4. Ascertain whether premium or bonuses are paid.
   (a) If so, is it considered as productive labor or overhead?
   (b) Is it shown on the cost time cards?
5. Ascertain whether the number of hours spent on each cost unit is accumulated.
6. Obtain full particulars as to whether the total number of hours for which value is distributed to costs are checked with the hours paid for according to time clock, payroll, or time-keeping records.
7. Determine whether a count is made of units produced by initial operation on jobs passing from operation to operation as a means of check on the maximum number to be paid.
   (a) If so, does the cost division secure and use such data?
   (b) How is it used?
8. Is indirect or non-productive labor distributed by departments?
   (a) If so, to what departments?
   (b) On what basis is the distribution made?
   (c) How often?

Payroll Accounting Defined.—Payroll accounting may be termed as that branch of accounting which is concerned with

the recording of credit to employees for work which they have performed, so as to enable prompt payment of wages and the accurate charging into costs by the cost department of all disbursements so made. The source of all entries is either: (1) a time ticket specifying number of hours or pieces, or both; or (2) a time-recording clock card.

Underlying Purposes of Payroll Accounting Systems.— The underlying purposes of the compilation of payroll data and their distribution are:

1. Pay-off data report of average earnings of each employee. Yearly earnings of each employee. To prevent the paying of more or less than has actually been earned by any employee.

2. Cost and statistical: (a) To distribute moneys paid over those departments in which the expense has actually been incurred, and against proper work orders, thereby enabling the management to determine the cost of direct or indirect labor in any department and also for each order and class of product. (b) To provide the mechanism for fully absorbing the entire payroll and other expenses in the cost of the product.

In a majority of plants there is a too frequent "labor turnover." Men are quitting or are being discharged at times other than at the end of a pay period. It is, therefore, essential that the posting of the earning records be kept up to date so that such men may be paid without delay and without danger of inaccuracies. Since all payroll information must be readily available, it should be remembered that an analysis of the payroll for use by the cost department must be regarded as secondary to the importance attached to the immediate need for pay-off information for payroll purposes. Payroll accounting may be classified as immediate and deferred. The payroll records are in the former class, and the payroll analysis records are in the latter.

Analyses of the payroll figures naturally vary in different businesses according to the information desired by the execu-

tives and the requirements found to exist by the accountant installing the system. In most cases, it is customary to analyze the payroll into direct and indirect labor. Direct labor may be subdivided into daywork, daywork-piecework, piecework, overtime, overtime allowance, bonus, and premium. Indirect labor may be subdivided into the same classifications, but generally the division is along lines of whether the work is chargeable to regular expense accounts, or to special or appropriation orders. Indirect labor is prorated over the product under the head of "burden." This analysis must furnish control figures to the cost department.

Preparation of Payroll and Payment.—Preparatory to paying employees it is customary to furnish the paymaster with a payroll, i.e., a list of names and amounts due. If payment is made in currency, the following plan may be used:

1. Pay envelope with name of employee written thereon.
2. Pay statement, showing all data of earnings and deductions. This may appear on the outside of the envelope itself or on a separate slip which is placed in the envelope.
3. Currency stuffed into envelope.

If payment is made by check, the plan below may be used:

1. Pay check written.
2. Pay statement prepared the same as if payment were made in currency.
3. Envelope may or may not be used to enclose check.

No matter whether payment is made by currency or check, a great amount of work is involved in these processes, which, under pen-kept methods, have to be separate processes. The use of mechanical accounting equipment has proved to be of great value in connection with operative accounting methods of payroll and its distribution, as such pay-off records may be

prepared in one operation consisting of two or more of the following:

1. Payroll.
2. Pay envelope.
3. Pay check.
4. Pay statement, either attached to check, separate, or on pay envelope.

When accounting machines are applied to payroll accounting conditions, additions and subtractions are automatically made as may be required for bonuses, overtime, rent, advances, bond and stock subscriptions, etc., and at the same time these computations are being made, totals are automatically established for proof.

No attempt is made to indicate any preferred method of preparing and maintaining payroll records, because the requirements of one business are so dissimilar to those of another; the management of one business may prefer to pay cash at a central point; another may provide envelopes, with or without receipts attached; while another may prefer the adoption of the bank check, with or without pay statement attached as a medium of payment for employees' services.

Advantage of the Bank Check Method.—The authors do not undertake to set up any one particular method as being ideal, although there do seem to be many marked advantages in the employment of the check method of payment instead of cash. In support of the advantages of the former method, it might be well to point out the hazard involved in handling large sums of cash at stated periods. During the past few years many serious and fatal incidents have occurred as a direct result of attempts to secure payrolls from paymasters and their assistants, while the funds were in transit from the bank to point of payment. Obviously, the substitution of the check for cash would eliminate the danger of such risks. The banks are very

agreeable to making arrangements for handling employees' checks, and the adoption of the pay check as a medium of payment for employees' services no longer places a burden upon the employee as it did when the introduction of the check was more or less of an innovation.

Use of Bank Checks in the Form of Tabulating Machine Cards.—The accounting efficiency secured through tabulating card checks illustrated in Figure 69, may be cited as follows:

1. Check or cash register is automatically prepared.
2. Cancelled checks are automatically reconciled with bank statements.
3. Returned checks are automatically listed, facilitating the locating of checks outstanding.
4. Checks are automatically checked against the payroll.
5. They speed up accounting, assure results of certified accuracy, produce more legible records, and effect a decided saving in the initial cost of checks as well as in their handling.
6. They may be used in conjunction with electric tabulating and accounting machines, and can be applied to any existing payroll accounting condition.

Explanation of Routines in General Use.—The forms shown in Figure 70 are suitable where a careful tabulation of sales compared to individual earnings is desired. The departmental salary record is written singly or with any number of desired copies at the same time the individual salary account and pay envelope are prepared. The virtue of handling a payroll with forms similar to those exhibited may be seen from the statistical information it affords. Each member of the selling force is represented in the daily and weekly sales columns, and results of any given employee's sales efforts are readily ascertained. The information for income tax or other purposes is also available. This is a decided improvement over any other method of salary computation. It will be noted that the release

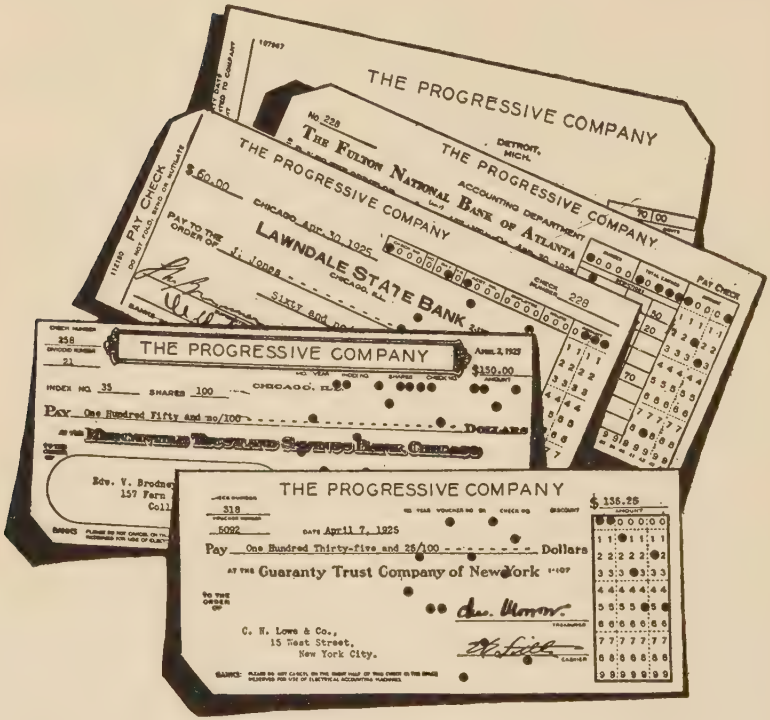


Figure 69. Tabulating Machine Card Form of Check

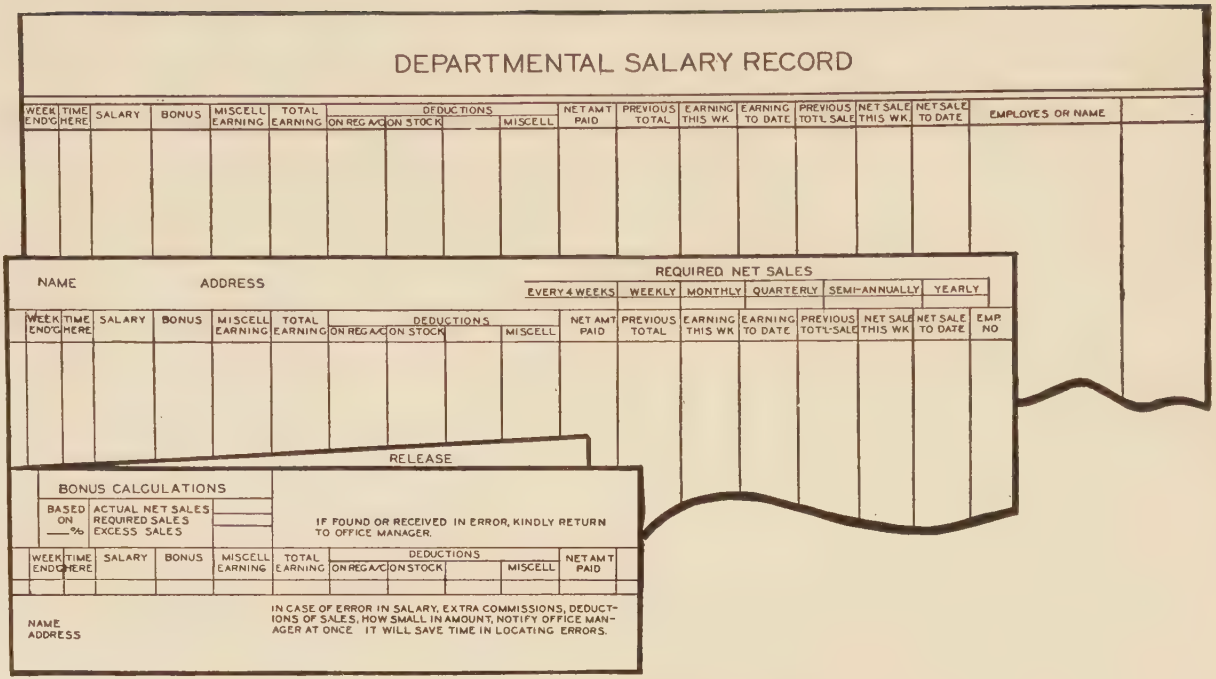


Figure 70. Departmental Salary Record—Individual Earnings Record—Pay Envelope with Pay-Off Release

attached to the envelope is signed by the employee upon receipt of pay.

The routine in connection with the forms shown in illustration Figure 71 is designed to fit a situation where a combination check, employee's ledger record, and payroll sheet are to be written in one operation. They are so designed that they provide for an appropriate distribution of the payroll as the check is written.

The forms in the system shown in Figure 71 are simultaneously written. Under this plan, so soon as the last check has been filled in, the payroll is complete because there is nothing further to do in connection with individual or departmental computations.

In order to control properly the work of the payroll department, it is of vital importance that a complete and detailed record be secured of every entry that is made. Machine computations that are not written in detail are of little value. As each entry is made, it is not only produced on the several records involved, but it is reproduced without extra effort on the payroll summaries which remain in the machine accumulating all entries, and afford visual proof of the work that has been done. From the totals recorded on this sheet we are able to prove the correctness of every record that has been written.

Since it is reasonable to expect that errors will be made from time to time, the means of locating errors by the mechanical accounting method is by such a summary as above referred to. When a mistake is made, its correction must be perfectly controlled. Every correction is shown in detail on this summary, furnishing a complete check of the operator's work. The advantage of such a method is that it is not necessary to refer to the individual earning ledgers in order to effect complete control.

Many firms arrange to make deductions from employees' salaries for savings and other purposes. As, in most instances, the posting media are the time cards, the earnings accounts are

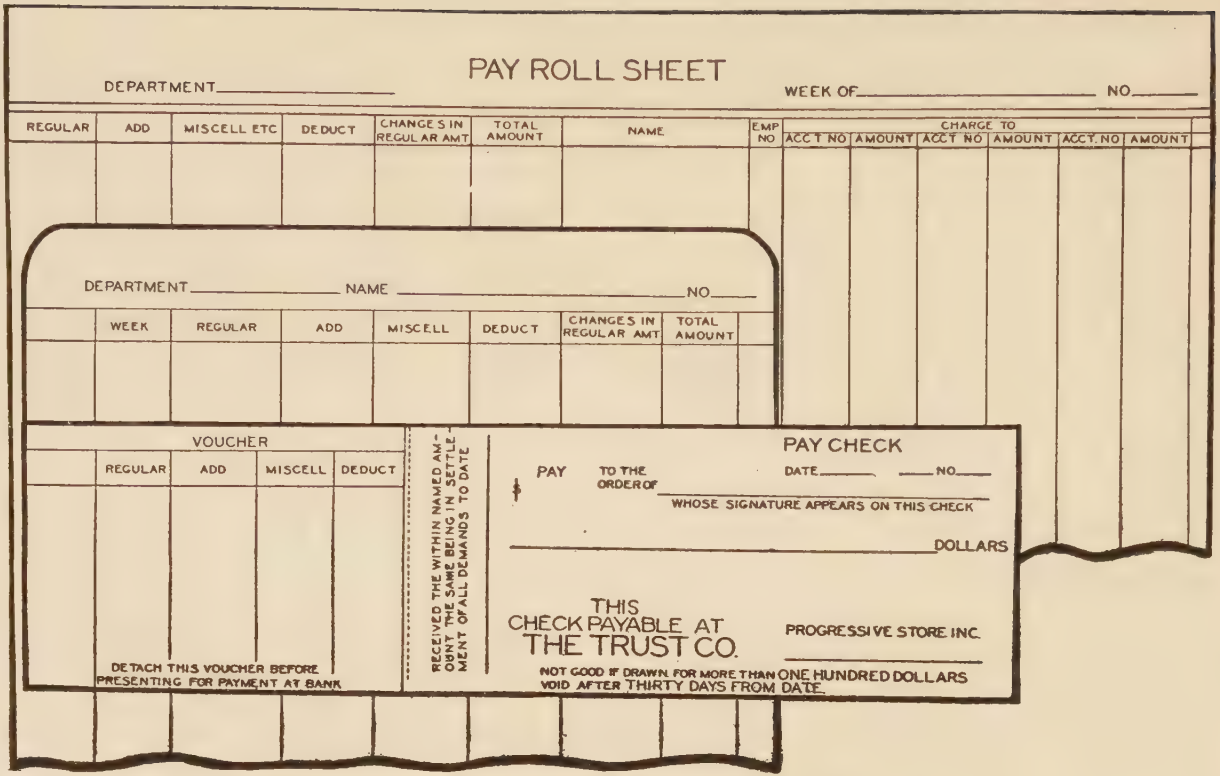


Figure 71. Payroll Sheet, Individual Earnings Ledger, Voucher Check

posted from this source, and earnings are accumulated as they are distributed by sub-classifications. At the end of the period the combined pay statement and envelope is prepared, showing total earnings, additions, deductions, and net amount due. The release attached to the pay statement is signed by the employee and constitutes a proper receipt. Under this arrangement every

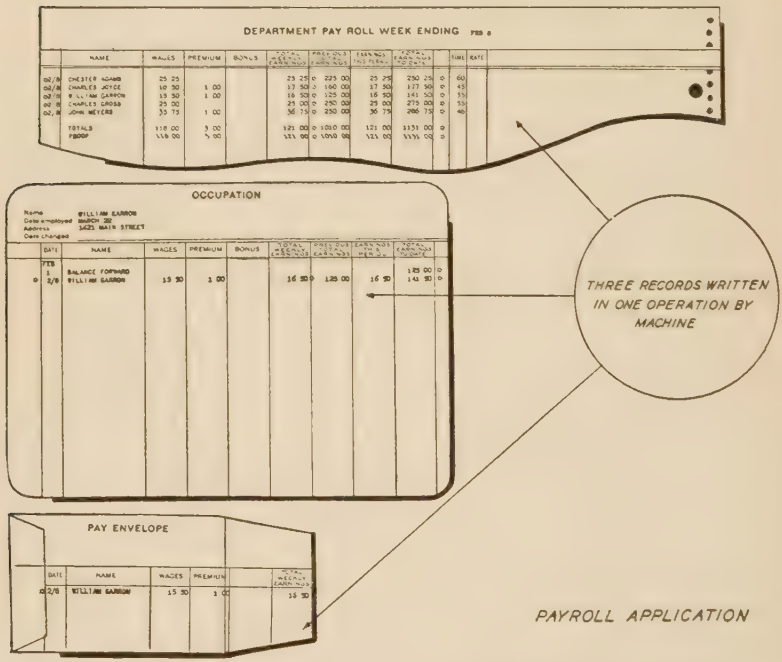


Figure 72. Department Payroll, Individual Earnings Record, and Pay Envelope

account which is shown in Figure 72 is in balance. The distribution requirements may be revised to cover any particular needs. Machine operators have been known to make as many as 1,800 entries per day on forms similar to those exhibited, while a very conservative average places the daily output at about 1,000 entries per day per operator. This is a splendid payroll arrangement, and it should be noted that every require-

ment of the government is fulfilled at the time an employee's account is credited.

There are a few accounting machines available that have universal typewriter keyboards, which visibly write, add, subtract, and compute vertical and horizontal balances simultaneously. These machines are operated in the same manner and with the same ease as a standard typewriter, and complete additions, subtractions, or computations are made with a single stroke of the key. No auxiliary mechanism is necessary, and it will be appreciated that this, together with the rapid collation of forms, makes for speed, accuracy, and economy.

Many splendid systems have been designed involving the use of cylindrical and flat-printing platen accounting machines which simplify and speed up work in connection with payroll preparation and its distribution—one of the most tedious, time-consuming clerical tasks of modern business. The cylindrical-printing platen machine prints pay check, voucher, payroll, and individual pay record card in one operation. One of the most essential features is a special type of carriage. This permits the insertion and removal of pay check and individual pay record card without disturbing the payroll sheet, which remains in the machine until completed.

The Ticket Method.—The flat-printing platen machine used in the following routine is provided with twenty-seven control totals and two group totals. The control totals, with their corresponding numbers, are used to represent different classifications on the payroll analysis work. Separate rate index plates are provided to show what each key represents on each run.

Rows 1 to 4, inclusive, of the number-printer keys are used to set up the employee number. The control totals represent labor classifications and sub-classifications on different runs. When the payroll is being distributed to nine labor classifications on the first run, the nine totals in row 3 are used.

On the same run, total key No. 1 is used to accumulate the total earnings of each employee. The group total at the bottom of row 2 (1GT) accumulates a total of the earnings in each department. The keyboard arrangement shown in Figure 73, shows the index placed on the machine on this first run.

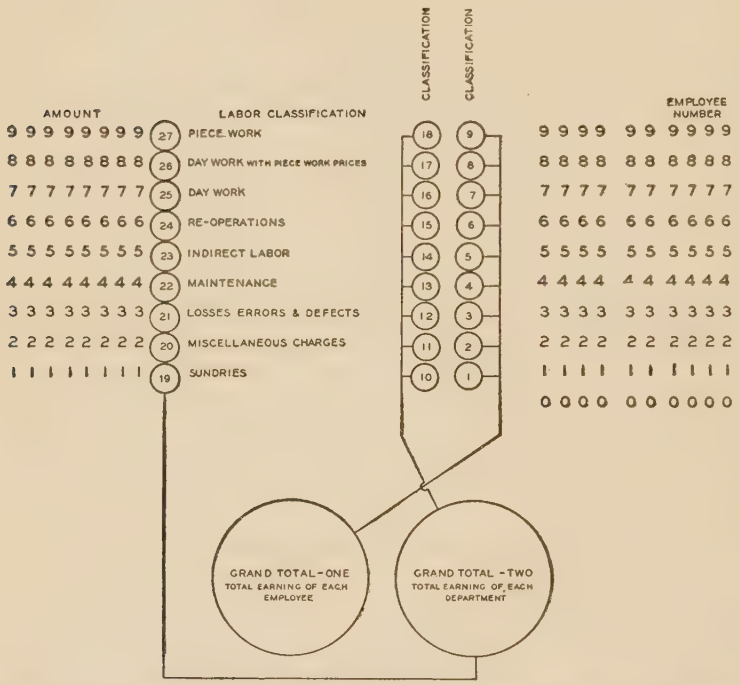

CLASSIFICATION
CLASSIFICATION
AMOUNT
LABOR CLASSIFICATION
EMPLOYEE NUMBER
9 9 9 9 9 9 9 9 (27) PIECE-WORK
8 8 8 8 8 8 8 8 (26) DAY WORK WITH PIECE WORK PRICES
7 7 7 7 7 7 7 7 (25) DAY WORK
6 6 6 6 6 6 6 6 (24) RE-OPERATIONS
5 5 5 5 5 5 5 5 (23) INDIRECT LABOR
4 4 4 4 4 4 4 4 (22) MAINTENANCE
3 3 3 3 3 3 3 3 (21) LOSSES ERRORS & DEFECTS
2 2 2 2 2 2 2 2 (20) MISCELLANEOUS CHARGES
1 1 1 1 1 1 1 1 (19) SUNDRIES
(18) (9)
(17) (8)
(16) (7)
(15) (6)
(14) (5)
(13) (4)
(12) (3)
(11) (2)
(10) (1)
9 9 9 9 9 9 9 9 9 9 9 9
8 8 8 8 8 8 8 8 8 8 8 8
7 7 7 7 7 7 7 7 7 7 7 7
6 6 6 6 6 6 6 6 6 6 6 6
5 5 5 5 5 5 5 5 5 5 5 5
4 4 4 4 4 4 4 4 4 4 4 4
3 3 3 3 3 3 3 3 3 3 3 3
2 2 2 2 2 2 2 2 2 2 2 2
1 1 1 1 1 1 1 1 1 1 1 1
0 0 0 0 0 0 0 0 0 0 0 0
GRAND TOTAL-ONE
TOTAL EARNING OF EACH EMPLOYEE
GRAND TOTAL -TWO
TOTAL EARNING OF EACH DEPARTMENT

Figure 73. Keyboard Arrangement of Flat-Printing Platen Accounting Machine Showing the Main Index and Captions Used on the Payroll Accumulation and Distribution Routine Described

Separate indexes are placed on the machine on the additional runs in order to obtain totals of the various sub-classifications under each of the major labor classifications.

The payroll distribution is made from employees' work tickets which are made up in the various departments. Each work ticket, illustrated in Figure 74, shows the employee's name

and number, name of piece, number of pieces, kind of work, hours, earnings, along with other information.

The timekeeping department proves each employee's work tickets against employee's clock card and totals all the tickets for a department on a listing machine. The tape from this machine is wrapped around the tickets. The work tickets for each department are handled in a similar manner, and then dispatched to the factory accounting department. The timekeeping department then obtains from the clock cards the total productive hours worked.

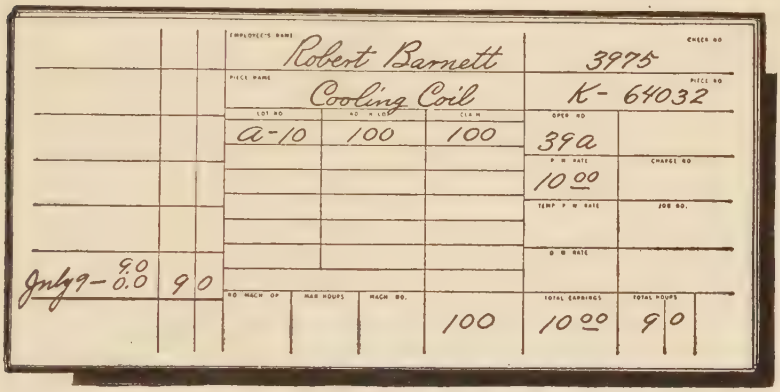


Figure 74. Employee's Work Ticket

The factory accounting department sorts the work tickets for each department separately by employees' numbers. Employee numbers run consecutively in each department and are sorted in numerical order. The first two digits in each number represent the department. The number-printer is used to set up the employee number. The work tickets for each employee in a department are analyzed separately. Before the tickets are run through the machine, the index showing the nine major labor classifications is placed on the keyboard of the machine.

The earnings shown on each work ticket are recorded by setting up the employee's number on the number-printer keys,

pressing the proper labor classification total in row 3, total (1) in row 1, which is used to accumulate the total earnings of each employee, and the motor bar. The employee's number is set up only as the amount of the first ticket for each employee is recorded.

The earnings are added on the labor classification total, and on the employee's total. It also adds on one grand total the group total at the bottom of row 2, which accumulates a total of all employees' earnings in a department. The audit sheet is printed with the item number, employee's number, symbols for the employee and labor classification totals, and the amount as in other applications previously described throughout this work.

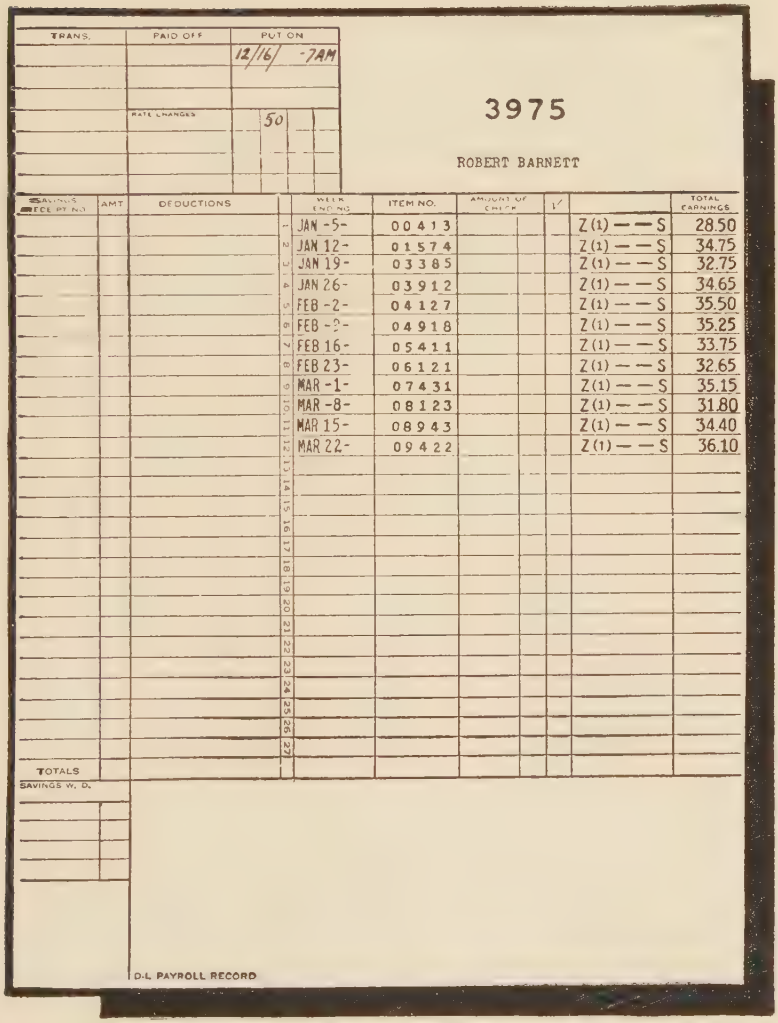
After all the work tickets for one employee have been recorded, the employee's payroll record card (Figure 75) is inserted on the printing table, and total (1) in row 1, which accumulates the total earnings of the employee, is cleared. The payroll record card is printed with the date of the pay period, the item number, symbol for the total, and the amount of earnings.

This card provides space for a certification of each week's earnings for the entire year, and is used as an authority for the paymaster to make up his payroll.

After all employees' earnings in one department have been recorded, the labor classification totals and the departmental total (one grand total) are cleared. The department total must agree with the total shown on the tape attached to the lot of work tickets from the timekeeping department. The labor cost in the department is thus distributed to each of nine kinds of labor classification.

The audit sheet is spaced after each employee's earnings are recorded. After all tickets for a department have been run, the audit sheet is removed from the machine.

The original and duplicate work tickets are then detached. The audit sheet is attached to the original work tickets which



TRANS. | PAID OFF | PUT ON 12/16/ 7AM

RATE CHANGES 50

3975

ROBERT BARNETT

SAVINGS RECEIPT NO.	AMT	DEDUCTIONS		WEEK END NO.	ITEM NO.	AMOUNT OF CHECK				TOTAL EARNINGS
			1	JAN -5-	00413			Z(1) — — S		28.50
			2	JAN 12-	01574			Z(1) — — S		34.75
			3	JAN 19-	03385			Z(1) — — S		32.75
			4	JAN 26-	03912			Z(1) — — S		34.65
			5	FEB -2-	04127			Z(1) — — S		35.50
			6	FEB -9-	04918			Z(1) — — S		35.25
			7	FEB 16-	05411			Z(1) — — S		33.75
			8	FEB 23-	06121			Z(1) — — S		32.65
			9	MAR -1-	07431			Z(1) — — S		35.15
			10	MAR -8-	08123			Z(1) — — S		31.80
			11	MAR 15-	08943			Z(1) — — S		34.40
			12	MAR 22-	09422			Z(1) — — S		36.10
			13							
			14							
			15							
			16							
			17							
			18							
			19							
			20							
			21							
			22							
			23							
			24							
			25							
			26							
			27							
TOTALS										

SAVINGS W. D.

D-L PAYROLL RECORD

Figure 75. Employee's Payroll Record Card

are filed. The work tickets for all remaining departments are analyzed in a similar manner.

All the duplicate work tickets for all departments are then sorted by the nine kinds of labor classification. The tickets are recorded on the machine to obtain the total labor cost for each major labor classification.

The labor cost totals are used to prove the accuracy of the previous distribution of earnings. They also provide a check on the loss of a work ticket or the changing of the amount earned on the duplicate ticket. The earnings of salaried employees are also recorded on the labor classification totals at this time.

The duplicate work tickets for each kind of labor classification are then recorded separately on the machine in order to obtain totals of the various sub-classifications under each of the nine kinds of labor classifications.

A separate index showing the sub-accounts, represented by numbers, under each main account, is used on each of these runs. The grand total of all sub-accounts under each main account must equal the total of each main account obtained on the previous run.

A ticket is issued as each amount is recorded. The number-printer keys are used in this case to set up the numbers of the department in which the work was done, the department charged, and the account number. These tickets are then filed according to the department number in which the work was done.

At the end of the month the tickets are removed from the file, and are totaled according to the various department numbers. This is done in order to form a basis for redistributing indirect departmental labor (overhead) to the departments which they have served.

The following results are obtained from the payroll distribution and accumulation routine just described:

1. Total labor cost for each of nine major classifications in each department.
2. Total labor cost for each of nine major classifications in all departments.
3. Total labor cost for each of the sub-classifications under the nine major classifications of labor.
4. Total earnings of each employee posted to his payroll record card.
5. Total productive hours for each of the three productive labor classifications.

Punch Card Method.—The following is an outline of the use of electric tabulating and accounting equipment employing punched cards for payroll accounting.

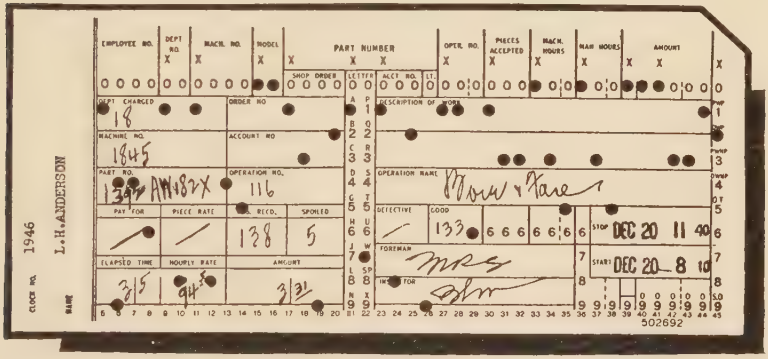


Figure 76. Job Card

To begin, an individual job ticket (Figure 76) is used for reporting both productive and non-productive labor.

In order that job, part, or operation costs may be available on a daily or accumulative basis under the routine described, payroll summary cards are punched each day, thereby releasing the individual job tickets for cost purposes.

Each day after the job tickets have been punched and verified, they are sorted to employee number and listed on the tabulating machine. The model, part number, operation num-

ber, pieces accepted, machine hours, man hours, and amount are listed, controlling on employee number, thereby accumulating the man hours and amount for each employee.

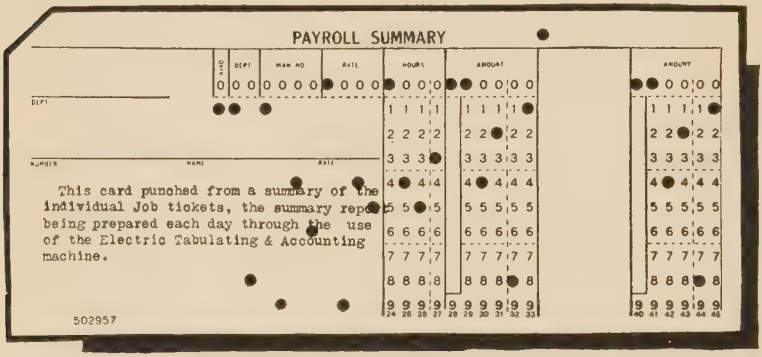

PAYROLL SUMMARY
This card punched from a summary of the individual Job tickets, the summary repo being prepared each day through the use of the Electric Tabulating & Accounting machine.
502957

Figure 77. Payroll Summary Card

The above daily report is prepared for each department, and upon its completion is dispatched to the timekeeping division, where the total time of each employee is checked against the

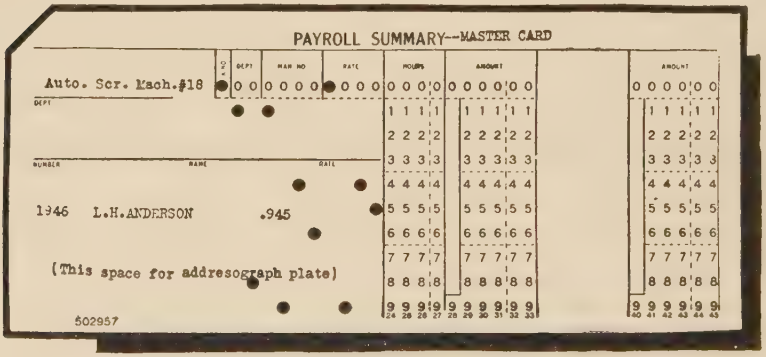


Figure 78. Payroll Summary (Master Card)

"in and out" clock cards. Corrections are made where necessary, and the sheets are returned to the tabulating department so that the individual job tickets may be corrected. The report then serves a dual purpose, first as a medium for punching the

payroll summary cards, and second, as a payroll reference, eliminating the necessity of referring to the individual job tickets for payroll adjustments.

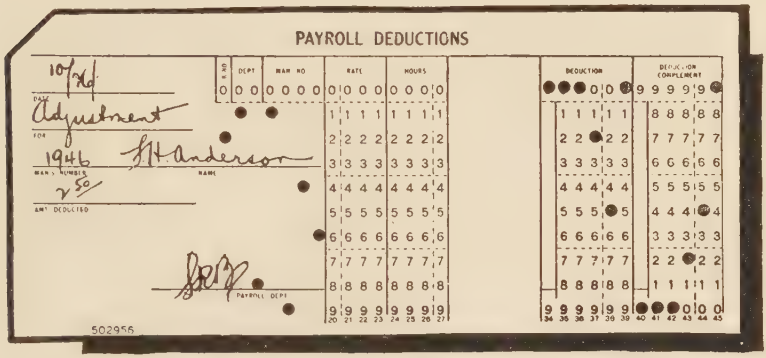


Figure 79. Card Used for Payroll Deductions

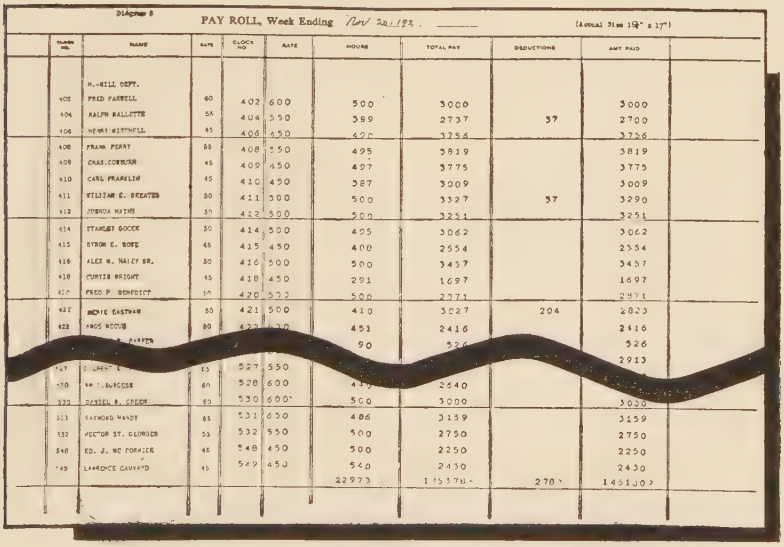


Figure 80. Payroll Prepared on Electrical Tabulating Machines

A payroll summary card, as illustrated in Figure 77, is punched from the time summary report for each employee. It may be stated that these cards are imprinted by means of an

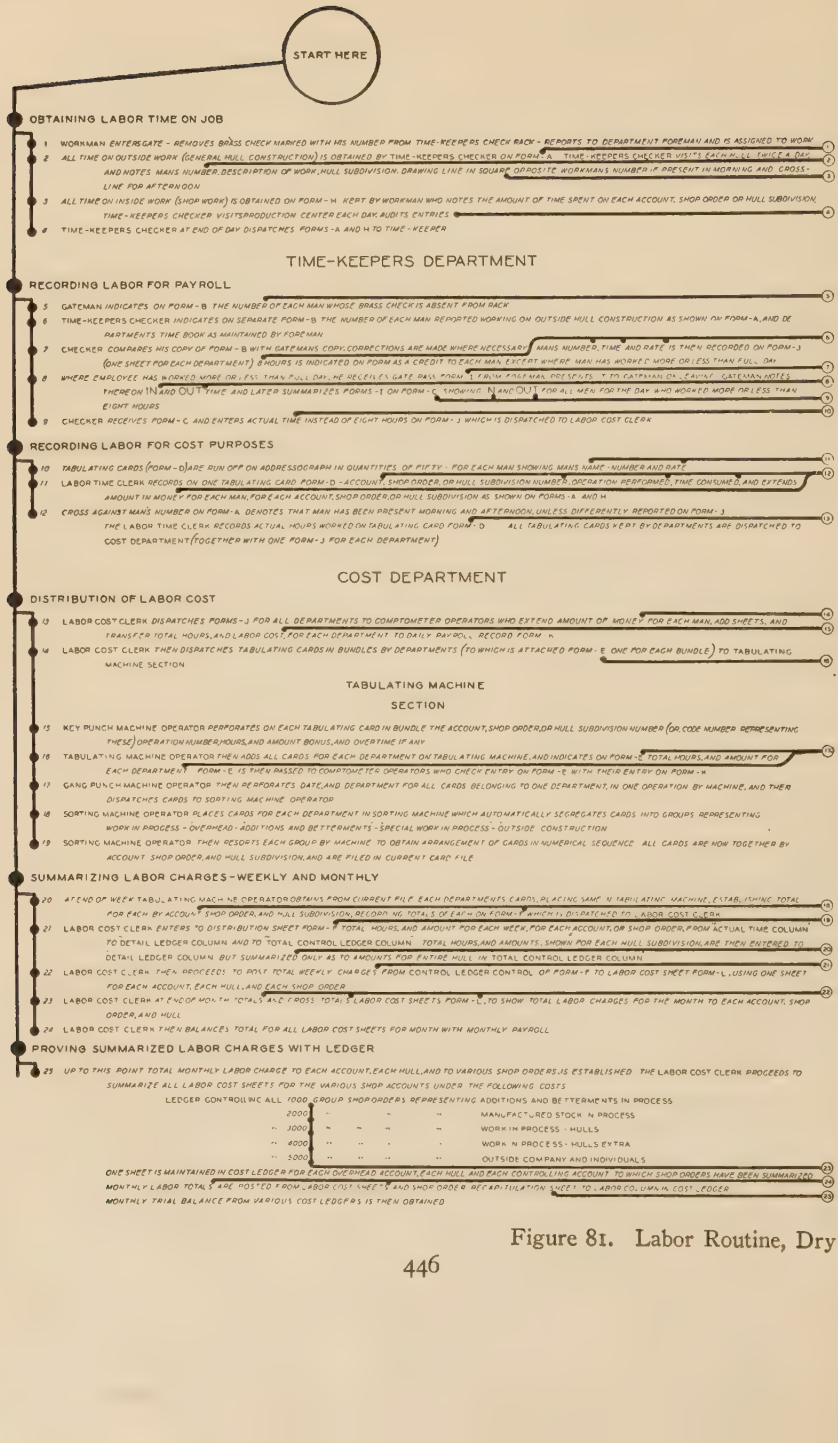
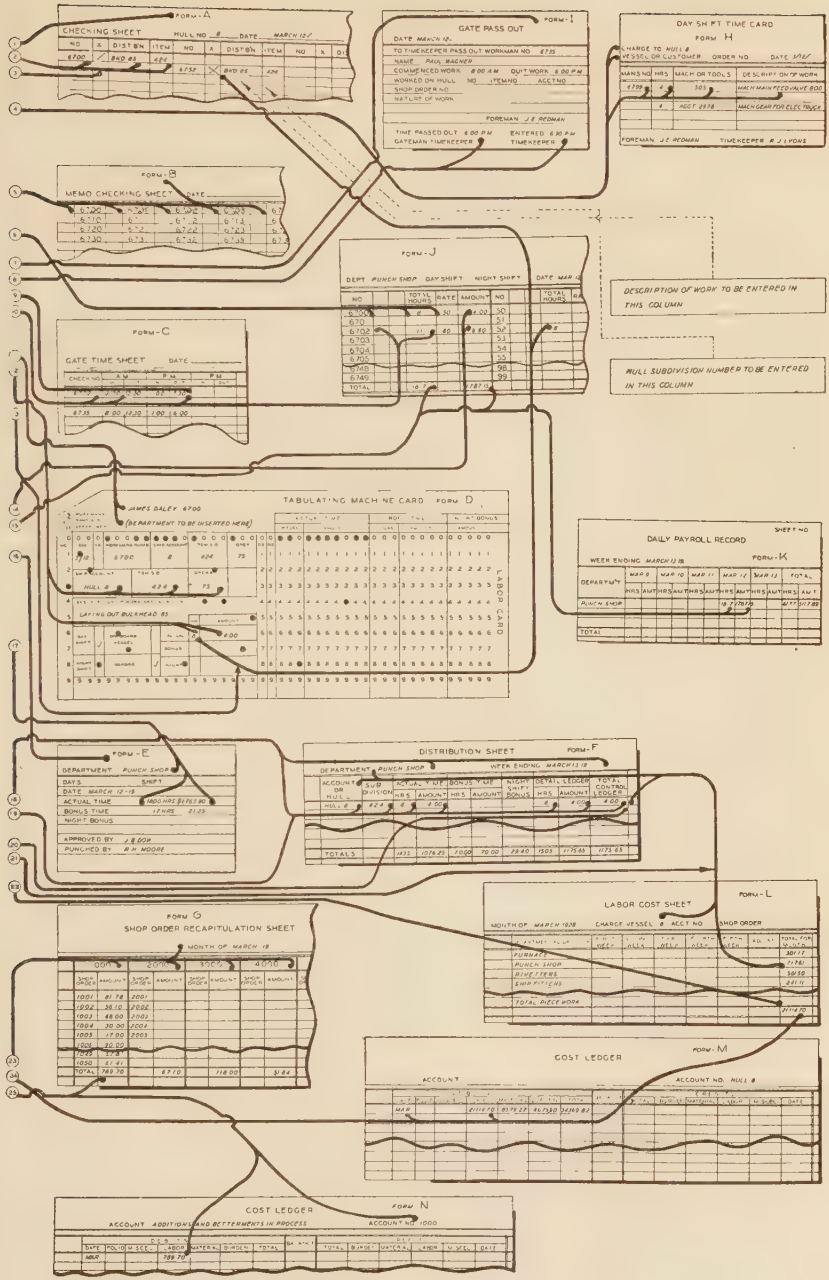

START HERE
OBTAINING LABOR TIME ON JOB
1 WORKMAN ENTERS GATE - REMOVES BRASS CHECK MARKED WITH HIS NUMBER FROM TIME-KEEPERS CHECK RACK - REPORTS TO DEPARTMENT FOREMAN AND IS ASSIGNED TO WORK
2 ALL TIME ON OUTSIDE WORK (GENERAL HULL CONSTRUCTION) IS OBTAINED BY TIME-KEEPERS CHECKER ON FORM - A TIME-KEEPERS CHECKER VISITS EACH W...LL TWICE A DAY AND NOTES MAN'S NUMBER, DESCRIPTION OF WORK, HULL SUBDIVISION, DRAWING LINE IN SQUARE OPPOSITE WORKMAN'S NUMBER IF PRESENT IN MORNING AND CROSS-LINE FOR AFTERNOON
3 ALL TIME ON INSIDE WORK (SHOP WORK) IS OBTAINED ON FORM - H KEPT BY WORKMAN WHO NOTES THE AMOUNT OF TIME SPENT ON EACH ACCOUNT, SHOP ORDER OR HULL SUBDIVISION
TIME-KEEPERS CHECKER VISITS PRODUCTION CENTER EACH DAY, AUDITS ENTRIES
4 TIME-KEEPERS CHECKER AT END OF DAY DISPATCHES FORMS - A AND H TO TIME-KEEPER
TIME-KEEPERS DEPARTMENT
RECORDING LABOR FOR PAYROLL
5 GATEMAN INDICATES ON FORM - B THE NUMBER OF EACH MAN WHOSE BRASS CHECK IS ABSENT FROM RACK
6 TIME-KEEPERS CHECKER INDICATES ON SEPARATE FORM - B THE NUMBER OF EACH MAN REPORTED WORKING ON OUTSIDE HULL CONSTRUCTION AS SHOWN ON FORM - A, AND DEPARTMENTS TIME BOOK AS MAINTAINED BY FOREMAN
7 CHECKER COMPARES HIS COPY OF FORM - B WITH GATEMAN'S COPY, CORRECTIONS ARE MADE WHERE NECESSARY MAN'S NUMBER, TIME AND RATE IS THEN RECORDED ON FORM - J (ONE SHEET FOR EACH DEPARTMENT) 8 HOURS IS INDICATED ON FORM AS A CREDIT TO EACH MAN, EXCEPT WHERE MAN HAS WORKED MORE OR LESS THAN FULL DAY
8 WHERE EMPLOYEE HAS WORKED MORE OR LESS THAN FULL DAY, HE RECEIVES GATE PASS FROM FOREMAN, PRESENTS IT TO GATEMAN OR CLERK GATEMAN NOTES THEREON IN AND OUT TIME AND LATER SUMMARIZES FORMS - I ON FORM - C SHOWING N AND OUT FOR ALL MEN FOR THE DAY WHO WORKED MORE OR LESS THAN EIGHT HOURS
9
10 CHECKER RECEIVES FORM - C AND ENTERS ACTUAL TIME INSTEAD OF EIGHT HOURS ON FORM - J WHICH IS DISPATCHED TO LABOR COST CLERK
RECORDING LABOR FOR COST PURPOSES
11 TABULATING CARDS (FORM - D) ARE RUN OFF ON ADDRESSOGRAPH IN QUANTITIES OF FIFTY - FOR EACH MAN SHOWING MAN'S NAME - NUMBER AND RATE
12 LABOR TIME CLERK RECORDS ON ONE TABULATING CARD FORM - D - ACCOUNT, SHOP ORDER, OR HULL SUBDIVISION NUMBER, OPERATION PERFORMED, TIME CONSUMED, AND EXTENDS AMOUNT IN MONEY FOR EACH MAN, FOR EACH ACCOUNT, SHOP ORDER, OR HULL SUBDIVISION AS SHOWN ON FORMS - A AND H
13 CROSS AGAINST MAN'S NUMBER ON FORM - A DENOTES THAT MAN HAS BEEN PRESENT MORNING AND AFTERNOON, UNLESS DIFFERENTLY REPORTED ON FORM - J
THE LABOR TIME CLERK RECORDS ACTUAL HOURS WORKED ON TABULATING CARD FORM - D ALL TABULATING CARDS KEPT BY DEPARTMENTS ARE DISPATCHED TO COST DEPARTMENT (TOGETHER WITH ONE FORM - J FOR EACH DEPARTMENT)
COST DEPARTMENT
DISTRIBUTION OF LABOR COST
14 LABOR COST CLERK DISPATCHES FORMS - J FOR ALL DEPARTMENTS TO COMPTOMETER OPERATORS WHO EXTEND AMOUNT OF MONEY FOR EACH MAN, ADD SHEETS, AND
15 TRANSFER TOTAL HOURS, AND LABOR COST, FOR EACH DEPARTMENT TO DAILY PAYROLL RECORD FORM - K
16 LABOR COST CLERK THEN DISPATCHES TABULATING CARDS IN BUNDLES BY DEPARTMENTS (TO WHICH IS ATTACHED FORM - E ONE FOR EACH BUNDLE) TO TABULATING MACHINE SECTION
TABULATING MACHINE SECTION
17 KEY PUNCH MACHINE OPERATOR PERFORATES ON EACH TABULATING CARD IN BUNDLE THE ACCOUNT, SHOP ORDER, OR HULL SUBDIVISION NUMBER (OR CODE NUMBER REPRESENTING THESE) OPERATION NUMBER, HOURS, AND AMOUNT BONUS, AND OVERTIME IF ANY
18 TABULATING MACHINE OPERATOR THEN ADDS ALL CARDS FOR EACH DEPARTMENT ON TABULATING MACHINE, AND INDICATES ON FORM - E TOTAL HOURS, AND AMOUNT FOR EACH DEPARTMENT FORM - E IS THEN PASSED TO COMPTOMETER OPERATORS WHO CHECK ENTRY ON FORM - E WITH THEIR ENTRY ON FORM - K
19 GANG PUNCH MACHINE OPERATOR THEN PERFORATES DATE, AND DEPARTMENT FOR ALL CARDS BELONGING TO ONE DEPARTMENT, IN ONE OPERATION BY MACHINE, AND THEN DISPATCHES CARDS TO SORTING MACHINE OPERATOR
20 SORTING MACHINE OPERATOR PLACES CARDS FOR EACH DEPARTMENT IN SORTING MACHINE WHICH AUTOMATICALLY SEGREGATES CARDS INTO GROUPS REPRESENTING WORK IN PROGRESS - OVERHEAD - ADDITIONS AND BETTERMENTS - SPECIAL WORK IN PROGRESS - OUTSIDE CONSTRUCTION
21 SORTING MACHINE OPERATOR THEN RESORTS EACH GROUP BY MACHINE TO OBTAIN ARRANGEMENT OF CARDS IN NUMERICAL SEQUENCE ALL CARDS ARE NOW TOGETHER BY ACCOUNT, SHOP ORDER, AND HULL SUBDIVISION, AND ARE FILED IN CURRENT CARD FILE
SUMMARIZING LABOR CHARGES - WEEKLY AND MONTHLY
22 AT END OF WEEK TABULATING MACHINE OPERATOR OBTAINS FROM CURRENT FILE EACH DEPARTMENT'S CARDS, PLACING SAME IN TABULATING MACHINE, ESTABLISHING TOTAL FOR EACH BY ACCOUNT, SHOP ORDER, AND HULL SUBDIVISION, RECORDING TOTALS OF EACH ON FORM - F WHICH IS DISPATCHED TO LABOR COST CLERK
23 LABOR COST CLERK ENTERS TO DISTRIBUTION SHEET FORM - F TOTAL HOURS AND AMOUNT FOR EACH WEEK, FOR EACH ACCOUNT, OR SHOP ORDER, FROM ACTUAL TIME COLUMN TO DETAIL LEDGER COLUMN AND TO TOTAL CONTROL LEDGER COLUMN TOTAL HOURS, AND AMOUNTS, SHOWN FOR EACH HULL SUBDIVISION, ARE THEN ENTERED TO DETAIL LEDGER COLUMN BUT SUMMARIZED ONLY AS TO AMOUNTS FOR ENTIRE HULL IN TOTAL CONTROL LEDGER COLUMN
24 LABOR COST CLERK THEN PROCEEDS TO POST TOTAL WEEKLY CHARGES FROM CONTROL LEDGER CONTROL OF FORM - F TO LABOR COST SHEET FORM - L, USING ONE SHEET FOR EACH ACCOUNT, EACH HULL, AND EACH SHOP ORDER
25 LABOR COST CLERK AT END OF MONTH TOTALS AND CROSS TOTALS LABOR COST SHEETS FORM - L, TO SHOW TOTAL LABOR CHARGES FOR THE MONTH TO EACH ACCOUNT, SHOP ORDER, AND HULL
26 LABOR COST CLERK THEN BALANCES TOTAL FOR ALL LABOR COST SHEETS FOR MONTH WITH MONTHLY PAYROLL
PROVING SUMMARIZED LABOR CHARGES WITH LEDGER
27 UP TO THIS POINT TOTAL MONTHLY LABOR CHARGE TO EACH ACCOUNT, EACH HULL, AND TO VARIOUS SHOP ORDERS IS ESTABLISHED THE LABOR COST CLERK PROCEEDS TO SUMMARIZE ALL LABOR COST SHEETS FOR THE VARIOUS SHOP ACCOUNTS UNDER THE FOLLOWING COSTS
LEDGER CONTROLLING ALL 1000 GROUP SHOP ORDERS REPRESENTING ADDITIONS AND BETTERMENTS IN PROCESS
2000 " " " " MANUFACTURED STOCK IN PROCESS
3000 " " " " WORK IN PROCESS - HULLS
4000 " " " " WORK IN PROCESS - HULLS EXTRA
5000 " " " " OUTSIDE COMPANY AND INDIVIDUALS
ONE SHEET IS MAINTAINED IN COST LEDGER FOR EACH OVERHEAD ACCOUNT, EACH HULL AND EACH CONTROLLING ACCOUNT TO WHICH SHOP ORDERS HAVE BEEN SUMMARIZED
28 MONTHLY LABOR TOTALS ARE POSTED FROM LABOR COST SHEETS AND SHOP ORDER RECAPITULATION SHEET TO LABOR COLUMN IN COST LEDGER
29 MONTHLY TRIAL BALANCE FROM VARIOUS COST LEDGERS IS THEN OBTAINED

Figure 81. Labor Routine, Dry



Dock and Construction Application

addressing machine, from the same plate or stencil as that used for imprinting the weekly "in and out" cards and payroll sheets. Each time a new plate or stencil is cut reflecting changes in rates, employee numbers, or the addition of new employees, a master tabulating card is imprinted from it and forwarded to the tabulating department for insertion in their file. Employment termination notices are used as a basis for removing master cards (Figure 78) from the file.

The payroll deduction card, illustrated in Figure 79, is used for constant deductions such as community chest, thrift club, beneficial society, and special deductions, such as sales to employees, advances, adjustments, etc.

At the end of the payroll period, the cards of each department are sorted by employee number in the following sequence: payroll summary, master card, payroll summary card, payroll deductions. They are then tabulated on the tabulating equipment, with the result as shown in Figure 80.

Upon completion of the payroll, the payroll summary cards are filed to be used later for compiling employees' wage statistics, while the payroll deduction cards are used for preparing an analysis of deductions by kind and department.

To illustrate further the facility with which the punched card method of tabulation may be applied to payroll and labor cost accounting conditions, a routine is presented with explanations in Figure 81. By following line at top of page, starting at the point indicated by circle shown there, the logical sequence of the routine may be followed without difficulty.

CHAPTER XV

THE GENERAL AND SUBSIDIARY LEDGERS

Important Elements of General Accounting.—Throughout the preceding chapters reference has been constantly made to the various methods of mechanical accounting application to most of the important elements of general accounting. The use made of such data in the compilation of financial and operating summaries may be traced, first, through the ledgers, where the basic particulars are grouped and summarized in accounts; second, into books of original entry (in many instances being automatically prepared during machine operation, viz., proof or register sheets, etc.) where the information is chronologically recorded and classified to ultimately fit the requirements of financial and operating summaries; and finally, to the various media arising out of the transaction, being the basic or original source of all records of accounting.

General Ledger Defined.—The general ledger is a book of accounts into which are collected the essential data required for statement preparation, and through the mechanism of the account it becomes an analytical record of all transactions, each account containing a record of one or more items, and being known by its specific or descriptive heading, or by a number or symbol.

What the Title of an Account Should Indicate.—The title given to an account is very important. It should indicate clearly and comprehensively the composition of the account. A title that does not indicate the true nature of the account gives rise to evidence of a lack of knowledge of accounting principle, or of a tendency to conceal data which will not bear close

scrutiny. The selection of correct account titles, therefore, is a basic necessity in good acounting practice.

Unit Construction for the Ledger Account Sheet.—The unit of construction for the ledger account sheet is the column, which may be defined as a specified amount of paper space between two parallel lines which should be made to conform to accounting machine writing and calculating specifications. The most simple form of ledger account adapted to mechanical accounting equipment contains four columns, viz., Previous Balance, Debit, Credit, and New Balance columns. The last amount appearing in the New Balance column is entered in the Previous or Old Balance column for the purpose of setting up in the machine the net cumulative (increases less decreases) amount, to which all increases may be mechanically added or decreases mechanically subtracted to indicate a new net cumulative amount in the New Balance column. The arrangement of the columns is made use of to facilitate comparison between increases and decreases—the posted debit and credit entries—and to obtain the proper expression of the information regarding such debit and credit entries, due consideration being given to posting convenience and ready reference.

Standard Ruling of Ledger Sheet.—The standard ruling of ledger sheet adapted to mechanical accounting equipment illustrated throughout this book meets all the requirements encountered under ordinary conditions. The standard ledger ruling may be deviated from in accordance with the following factors:

1. When the distinction between debit and credit is not regarded as essential as some other consideration, such as the comparison as represented by the new balance column.

2. When the distinction between debit and credit is important and highly desirable; but in addition, more important consideration must be given to other factors, such as a separate cumulative total

of debit and credit entries, or a cumulative total of net debits or net credits for a specific period, in addition to a current net decrease or increase of debits or credits such as the "new balance."

Variations of Standard Form of Ledger Sheet.—The various methods deviating from the standard form of ledger account adaptable to mechanical accounting equipment are based upon the following principles:

1. Rearrangement of the position of Old Balance, Debit, Credit, and New Balance columns to conform to explanation and reference considerations.
2. Adding one or more quantity or value columns, or both:
   (a) Memorandum column.
   (b) To contain analyses of a basic column, such as a tabulator ledger sheet. The modes in which a ledger sheet may be tabulated are so various that it is difficult to give a typical illustration as standard.
   (c) To secure a combination of (a) and (b) above.

The Size of Ledgers.—A ledger may be contained in a dozen volumes, or a dozen ledgers may be contained in one volume, as it is by no means limited by its binding. When the entries in such records are written with mechanical accounting equipment, the ledger may be either in loose-leaf or card form. These forms of ledgers lend themselves particularly well to any desired grouping of the accounts, which may either be arranged numerically when accounts are numbered instead of by names; or arranged as to classes, and each class made self-indexing; or by geographical arrangement. These forms of ledgers facilitate the discarding or filing away of all "inactive" accounts, thus permitting the active portion of the ledger to be handled easily and be less cumbersome. Where it is found necessary and desirable, especially during end-of-month peak load periods, several clerks may work simultaneously on the ledger, since the pages or cards are removable and are easily distributed.

Posting Direct from Media.—It may be stated that more than fifty per cent of mechanical accounting equipment in use is applied to accounting conditions in which ledger postings are combined with the writing of other records. The act of transferring an entry appearing in a book of original entry into the ledger is called posting under pen-kept methods. Under mechanical methods, the act of transferring the original entry from its origin (the medium) direct into the ledger, preparing in the process of the transfer all essential records (which under pen methods are commonly called "books of original entry") is also called posting. The preparation of all books of original entry under mechanical accounting methods, therefore, becomes a secondary matter, since the original medium or source of the entry is of prime importance in posting, rather than the books of original entry as maintained under pen methods. The distinction between "writing up" and "posting" vanishes under mechanical methods, as every medium of entry is directly entered to the ledger where it should be.

It is advisable that all media of entry have appropriate places for noting that posting has been made, either by a reference number or letter, or by a check mark. All media of a certain form may, in some cases, be numbered in sequence, so as to determine the order of occurrence if such is desired, either by having the number printed on the media; or such order of rotation may be applied when the media begin to serve their purpose.

The Advantages of Posting from Media Direct to Ledger.—The practical advantages of posting from media direct to ledger over posting from books of original entry to ledger are as follows:

1. The accounting medium is entered direct to its respective account in the ledger, so that there is no need to rely on memory, even for the brief space of time that is required to pass from medium to a page of an accounting record of entry, and thence

to that of the ledger. This brief time is sufficient to cause many errors, because of the absence of the medium in the last operation.

2. Accounting media may and should be sorted by ledger sequence without being required to be posted in scattered fashion as is usually necessary when posting from an accounting record of entry to the ledger.

3. Since only one accounting medium at a time is exposed to view, errors are reduced to a minimum.

4. Accounting media may be distributed to several individuals for posting at the same time, whereas with most pen-kept accounting records of entry, each individual is required to wait until the completion of work thereon by another.

5. The preservation of the original media renders it unnecessary to duplicate by posting detailed entries in books for reference.

Classification of Accounts.—It may be stated that the nature and characteristics of accounts determine the extent of the general and subsidiary ledgers, e.g., accounts kept with persons, as in accounts receivable and payable ledgers mentioned in previous chapters; with physical business facilities, as in property ledgers; and with intangible items, such as goodwill, etc. Accounts may also contain either similar or dissimilar items, as in income and expense accounts, which are often carried in income and expense distribution subsidiary ledgers.

The Structure of a Ledger.—All accounts collected together as a group, with the groups taken as a unit, compose and make a ledger. Records of original entry merely serve as channels through which the recorded information concerning business transactions may pass. The subdivision of the ledger is made use of to facilitate the localization of errors, and expedites the tests which must be made to prove the equality of the total of increases and decreases recorded as debits and credits. This test is called the trial balance. The subdivision of the ledger lends itself particularly well to the division of operative accounting routine ledger work among a number of employees as previously referred to. No matter

how many ledgers may be kept, they may all be considered as sections of one ledger—the General Ledger, in which each section is represented by a summary account, its controlling account.

The Purpose of a Controlling Account.—The controlling account should be regarded as a convenience as well as a necessity. By means of the controlling account one ledger may be replaced by two or more ledgers. The controlling account or accounts take the place of a specific group or groups of detailed accounts without interfering with the ledger principle of equilibrium. One or more subsidiary ledgers may be controlled by a control account for each separate group or groups of detailed accounts as maintained in such a ledger or ledgers.

The Purpose of a Subsidiary Ledger.—The advisability of incorporating a controlling account into a subsidiary ledger and considering it controlled by the corresponding account in the general ledger, largely depends in each accounting condition upon the system of control to be effected. The controlling account employed as a means of localizing errors where ledger records are numerous, enables each separate division of the general ledger pertaining to the composition of such subsidiary ledger records to be proved as having been mathematically accurate. Beyond this fact, each ledger section or subsidiary ledger, is proved by being required at all times to be in agreement with the balance of the controlling account, as found in the general ledger. Therefore, the general ledger in modern systems of accounting is characteristic of a summary record, the accounts therein being of a summary nature, which facilitates the development and establishment of periodic proofs and controls.

In modern accounting practice, financial and operating summaries may be easily and quickly prepared from the general ledger through the employment of control accounts before each detail ledger has been completely posted. Under scientific

operative accounting routine methods, the procedure which permits the division of posting work among a number of employees and the localization of errors to a specific group of accounts must be obtained through the use of control accounts. Errors in posting to a customers' ledger, for example, made from basic or original media cannot be brought to light by the Customers' Ledger controlling account alone. If an error is made during the process of posting an item from the basic or original media to a customer's account upon the accounts receivable ledger, the fact that an error had been made would be disclosed only by comparison of the controlling account with the total of the aggregate accounts of the customers' ledger. Since the individual who maintains control over the detail ledger should not, where possible, keep the detail accounts which are controlled, care should be exercised to see that the figures used by each are identical. This may be accomplished by routing the basic or original media so that the control clerk first utilizes them, after which it is passed to machine operators for posting to detailed accounts.

Consideration of the accounting for the income and expense of a departmentalized organization divides itself into two sections: (1) the maintenance of a general ledger wherein income and expense accounts are provided for the company as a whole, which cares for all operations and transactions as though they were not departmentalized; (2) the maintenance of a departmental ledger wherein are recorded the operations and transactions of each individual department in the company.

What the Initial Account Records Comprise.—It should be firmly fixed in mind that the accounts pertaining to income and expense, together with the subsidiary accounts which record details, are the initial account records. The customary procedure is to carry in the general ledger the standard classification of accounts and to obtain distribution from these to the departmental ledger. In practice a departmental ledger may

be maintained under two general methods. The first method provides for the maintenance of a ledger wherein a full classification of accounts for each department is kept, to which entries are made from month to month, in a manner similar to the maintenance of ordinary accounts of a business that are accumulated from period to period. Under this method it is necessary to obtain trial balances periodically for the purpose of securing figures necessary for the preparation of monthly departmental operating summaries and reports. The second method provides for the maintenance of a departmental ledger wherein a full classification of accounts by departments is kept to which summarized entries are posted. Such a plan necessitates a new departmental account for each department each month, presenting a record of departmental activities in analyzed form, by departments. It also provides for the maintenance of a new departmental ledger each month.

Controlling Departmental Ledgers.—Under the above plans there are numerous methods of controlling departmental ledger accounts, three of which are briefly classified as follows:

1. By the maintenance of one controlling account in the general ledger to control the entire departmental ledger.
2. To control the departmental ledger by a group of departmental income and expense accounts.
3. By maintaining one controlling account in the general ledger, the composition of which is segregated into sub-controlling accounts for each account appearing in the departmental account classification.

Controlling Factory Cost Ledgers.—In developing methods of controlling factory costs, a separate factory ledger —usually termed manufacturing ledger, cost ledger, cost department ledger, or factory ledger—is maintained. This record is controlled by a single general ledger control account. When a subsidiary factory ledger is maintained it either is or is not self-balancing. In the latter instance the general ledger con-

trolling account balance must be secured before it can be established whether the factory accounts represented in the factory ledger are correct; whereas with the former method a general ledger account is maintained in the factory ledger corresponding to the control account kept in the general ledger to control the factory ledger.

Branch Accounting Control.—The widely varying policies of different organizations in the accounting for the operation of branch houses differ so greatly that it is difficult to present a method of control that may be considered standard. However, the more important of the numerous methods of effecting branch house accounting control is through:

1. A completely centralized accounting method, i.e., all accounting is handled at the main office.
2. Partial decentralization accounting method, i.e., branches bill and maintain own customers' accounts and stock records, with all other accounting routine work performed at the main office.
3. Complete decentralized accounting method, i.e., all accounting of the branch is handled at the branch.

Under the first method the plan of accounting control for departmental conditions may be applied to great advantage. The second and third methods of control are established through the medium of daily, weekly, or monthly reports of operating activities of each department of each branch. Details of these reports are placed in separate control accounts with each department of each branch in order to obtain the net results of branch activities.

Pyramiding of Controlling Accounts.—Since the ordinary use of controlling accounts is quite generally understood, it is considered desirable to take up next the pyramiding of controlling accounts to enable condensed classification to facilitate the preparation of financial and operating summaries and reports well in advance of the final closing of subsidiary records. The

pyramiding of controls makes possible the maintenance of a private ledger wherein appear only those accounts which are used in the preparation of financial and operating statements.

The Principle of Pyramiding Controls.—The principle of pyramiding controls is identical with the method of control employed over customers' ledgers. One customers' ledger control account may be maintained in the general ledger to care for the aggregate total balances of accounts appearing in forty or fifty customers' ledgers; the breaking up of this controlling account into individual memorandum ledger controls exemplifies the principle of pyramiding controls for general or private ledger purposes. This same principle is applicable to any account that may be kept in the private ledger, and may be worked out conveniently and without confusion by simply arranging the proper summarization of entries.

Use and Purpose of the Private Ledger.—The private ledger is usually considered as a section of the general ledger, the contents of which are regarded as confidential. In almost every business there is considerable information which the management desires to be kept confidential, such as investments, long-term indebtedness, fixed assets, capital accounts, and such other accounts which when formulated properly give information pertaining to the financial and operating activities of the firm.

The methods of maintaining private ledgers vary considerably. The underlying principles, however, are briefly described below. If the reader thoroughly understands the principle underlying the use of the customers' ledger control, little difficulty will be encountered in comprehending the control maintained in the private ledger.

Control Exercised by the Private Ledger.—The control exercised by the private ledger over the general ledger should be in a manner similar to that of maintaining controlling

accounts for the usual subsidiary ledgers. In a system where both the private ledger and general ledger are maintained, the latter might contain only accounts of current assets, such as cash and accounts receivable; and the current liability account of accounts payable, which are developed during the regular course of an accounting period; and a controlling account with the private ledger would be established to represent all other accounts. The general ledger, containing such few accounts as it does, is brought into balance by the private ledger controlling account, which will either have a debit or credit balance equal to the debit or credit balance in the general ledger controlling account found in the private ledger.

The general method of control is illustrated as follows:

Private Ledger Accounts	General Ledger Accounts	Subsidiary Ledgers Controlled
Assets Liabilities	Private Ledger Control	
Capital and Surplus Profit and Loss		
General Ledger Control	Cash	
	Accounts Receivable	Customers' Ledger
	Accounts Payable	Vendors' Ledger
	Income Accounts	
	Expense Accounts	Expense Ledger

As a matter of control illustration, it will be observed that the private ledger is provided with a controlling account over the general ledger, and that the general ledger is in turn provided with a controlling account over the customers' ledger.

Use of Accounting Machines for Posting Private Ledger. —Auxiliary to the private ledger there should be a private journal (machined proof or register sheet), onto which original entries are chronologically recorded when posting to the private ledger by machine, which entries should be eliminated from the machined proof or register sheet of the general journal pro-

duced by the machine operator. In operative mechanical accounting routine procedure, posting to the private ledger is made from media called "private ledger journal vouchers." Usually entries to a private ledger are few in number and are made at the end of each month. At the end of an accounting period, when the books are closed, the controlling account for the private ledger as carried on the general ledger should be treated as if it were a profit and loss account. The method of closing is as follows: All accounts in the general ledger, such as purchases, sales, expenses, etc. (exclusive of the inventory after adjustment has been properly made) are closed into the Private Ledger controlling account. An analysis of these entries should be made for the purpose of transfer to the private journal vouchers used as media in posting to the private ledger.

After the above analysis is made and all accounts, including those relating to the beginning and ending inventory, have been closed to the Private Ledger control account in the general ledger, they are then closed into the Profit and Loss account and General Ledger control account in the private ledger. After these entries have been properly made in the private ledger, the Profit and Loss account is closed in the usual way into the Capital accounts or into Surplus. The private ledger has the same status it had previous to the closing, namely:

Debits:	Various assets (not including cash or accounts receivable)
	General ledger control
Credits:	Various liabilities (not including accounts payable)
	Capital and surplus

Use of Journals under Mechanical Methods of Accounting.—The only books absolutely necessary under mechanical methods of accounting where descriptive writing accounting equipment is used, are the proof or register sheets (commonly called journals under pen methods) and the ledgers. Since

the first essential in the analysis of business transactions is the subdivision of the journal into separate journals, for which the proof or register sheets form a basis under mechanical methods of accounting, it can be readily appreciated that summarization of totals of such proof or register sheets will form the basis for general ledger entries. A brief explanation of the more simple forms of journals commonly used follows:

Purchase and Expense Journals. The use of any special form of purchase and expense journal, particularly if it provides for an analysis of purchases and expenses, requires a similar record of purchase returns and allowances, and expense credits. A separate book, similar in form, may be employed for recording these items.

Sales Journals. The same considerations which affect the purchase and expense journal apply to the sales journal.

Note and Acceptance Journals. These are sometimes used for a record of note transactions where notes and trade acceptances are sufficiently numerous. Provision is sometimes made for securing a proper analysis in order to distinguish between notes and trade acceptances from customers and notes from other sources. It will be observed that such an analysis is essential when controlling accounts are operated.

Cash Receipt and Disbursement Journal. Since the sources of cash receipts are usually more limited than the objects for which expenditures are made, they do not require so minute an analysis as do expenditures. However, the purchase and expense journals usually relieve the cash journal of such detail.

General Journal. There are certain transfers such as:

1. Incidental transfers from one general ledger to another, not comprised in the regular order of the business.
2. Opening entries expressing incorporation and capitalization.

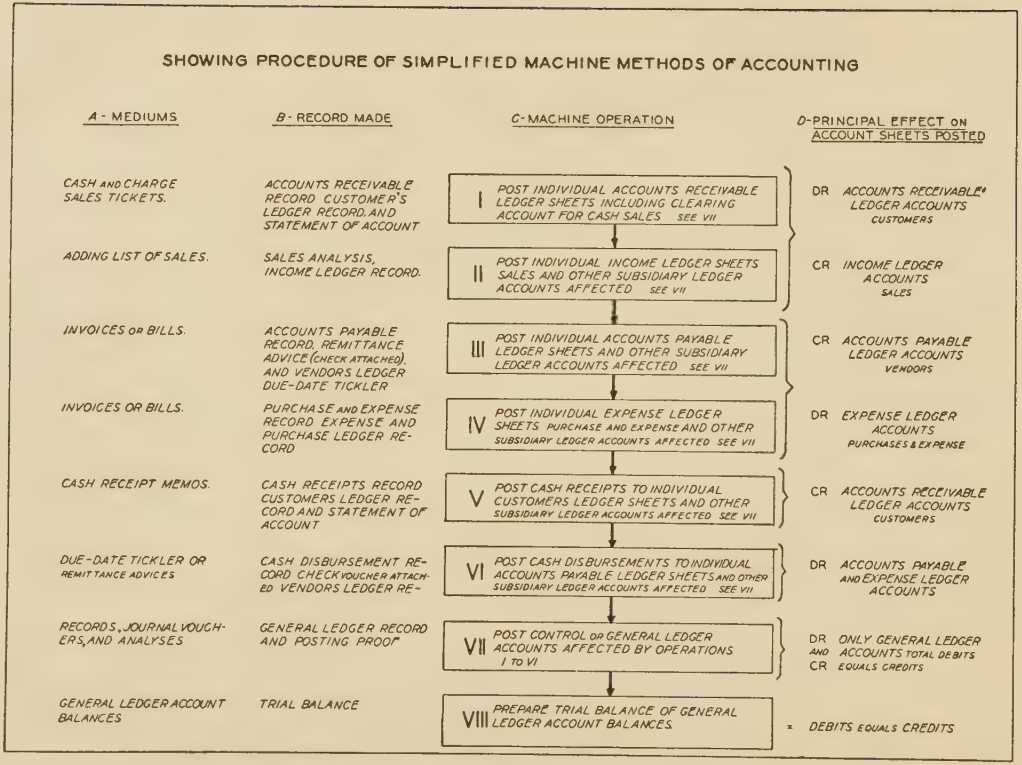

SHOWING PROCEDURE OF SIMPLIFIED MACHINE METHODS OF ACCOUNTING
A - MEDIUMS
B - RECORD MADE
C - MACHINE OPERATION
D - PRINCIPAL EFFECT ON ACCOUNT SHEETS POSTED
CASH AND CHARGE SALES TICKETS.
ACCOUNTS RECEIVABLE RECORD CUSTOMER'S LEDGER RECORD, AND STATEMENT OF ACCOUNT
I POST INDIVIDUAL ACCOUNTS RECEIVABLE LEDGER SHEETS INCLUDING CLEARING ACCOUNT FOR CASH SALES SEE VII
DR ACCOUNTS RECEIVABLE LEDGER ACCOUNTS CUSTOMERS
ADDING LIST OF SALES.
SALES ANALYSIS, INCOME LEDGER RECORD.
II POST INDIVIDUAL INCOME LEDGER SHEETS SALES AND OTHER SUBSIDIARY LEDGER ACCOUNTS AFFECTED SEE VII
CR INCOME LEDGER ACCOUNTS SALES
INVOICES OR BILLS.
ACCOUNTS PAYABLE RECORD, REMITTANCE ADVICE (CHECK ATTACHED), AND VENDORS LEDGER DUE-DATE TICKLER
III POST INDIVIDUAL ACCOUNTS PAYABLE LEDGER SHEETS AND OTHER SUBSIDIARY LEDGER ACCOUNTS AFFECTED SEE VII
CR ACCOUNTS PAYABLE LEDGER ACCOUNTS VENDORS
INVOICES OR BILLS.
PURCHASE AND EXPENSE RECORD EXPENSE AND PURCHASE LEDGER RECORD
IV POST INDIVIDUAL EXPENSE LEDGER SHEETS PURCHASE AND EXPENSE AND OTHER SUBSIDIARY LEDGER ACCOUNTS AFFECTED SEE VII
DR EXPENSE LEDGER ACCOUNTS PURCHASES & EXPENSE
CASH RECEIPT MEMOS.
CASH RECEIPTS RECORD CUSTOMERS LEDGER RECORD AND STATEMENT OF ACCOUNT
V POST CASH RECEIPTS TO INDIVIDUAL CUSTOMERS LEDGER SHEETS AND OTHER SUBSIDIARY LEDGER ACCOUNTS AFFECTED SEE VII
CR ACCOUNTS RECEIVABLE LEDGER ACCOUNTS CUSTOMERS
DUE-DATE TICKLER OR REMITTANCE ADVICES
CASH DISBURSEMENT RECORD CHECK VOUCHER ATTACHED VENDORS LEDGER RE-
VI POST CASH DISBURSEMENTS TO INDIVIDUAL ACCOUNTS PAYABLE LEDGER SHEETS AND OTHER SUBSIDIARY LEDGER ACCOUNTS AFFECTED SEE VII
DR ACCOUNTS PAYABLE AND EXPENSE LEDGER ACCOUNTS
RECORDS, JOURNAL VOUCHERS, AND ANALYSES
GENERAL LEDGER RECORD AND POSTING PROOF
VII POST CONTROL OR GENERAL LEDGER ACCOUNTS AFFECTED BY OPERATIONS I TO VI
DR ONLY GENERAL LEDGER AND ACCOUNTS TOTAL DEBITS
CR EQUALS CREDITS
GENERAL LEDGER ACCOUNT BALANCES
TRIAL BALANCE
VIII PREPARE TRIAL BALANCE OF GENERAL LEDGER ACCOUNT BALANCES
= DEBITS EQUALS CREDITS

Figure 82. Chart Showing Procedure of Simplified Machine Methods of Accounting

3. Adjustment of values.
4. Closing of accounts into a summary, profit and loss, or trading account.
5. Distributing net income or loss.

It will be observed that even under mechanical methods the use of the general journal is important. Inasmuch as all entries to the general ledger are made direct from supporting journal vouchers, the general journal which is automatically prepared during the process of posting to the general ledger becomes a chronological record of supporting journal vouchers posted.

When a correct and complete record of business transactions has been made in the various journals, under mechanical methods, such journals (proof or register sheets) become evidence that all current information required by the business has been completely entered and posted. While such data may be recorded in chronological order in journals under pen methods, they are not available for use until posted, whereas under machine methods the proof or register sheets are evidence that such data have been entered and posted complete.

It must be remembered that an essential part of posting under mechanical methods of accounting, in addition to recording the date and amount, is to cross-index every entry, i.e., to index both the ledger and proof or register sheet in one operation. A complete cross-reference and checking feature should be provided on all forms. They bring out clearly the facility with which mechanical descriptive writing and accounting equipment serves with a minimum of effort and time and a maximum degree of accounting control and efficiency.

Outline of a General Accounting System under Mechanical Methods.—The following mechanical accounting plan is presented to illustrate a scientific and orderly procedure of operative mechanical accounting routine. A program of this character should provide for all essentials required at any time

during an accounting period, as shown in the chart in Figure 82.

The plan is so arranged that any section may be used independently of all other sections without losing any of the advantages gained through the use of the equipment. The plan is divided into three general sections, which may be subdivided as follows:

Accounts Receivable:
- Sales
- Cash Receipts

Accounts Payable:
- Purchases
- Purchase Distribution
- Cash Disbursements

General and Expense Ledgers:
- Debits
- Credits

The summary of each division is shown on a proof or register sheet, and furnishes the posting media to the controlling accounts in the general ledger. The plan is so flexible and the range of machine application so wide that much additional valuable statistical and accounting information may be secured with little effort. For example, the memorandum journal (register of invoices received) may, when it is desirable, be converted into a posting medium to show liability on goods in transit and also to show available discounts on all invoices received as well as cash discounts lost.

Scope of the Plan—Operations

Accounts Receivable

Under the plan the major operations are as follows:

1. Posting customers' accounts and preparing statements.

Records Prepared:
- Customer's Monthly Statement
- Customers' Ledger (Posted)
- Sales Journal

2. Recording customers' cash payments.
   RECORDS PREPARED:
   - Customer's Statement
   - Customers' Ledger (Posted)
   - Cash Receipts Journal

ACCOUNTS PAYABLE

The major operations are as follows:

1. Registering invoices.
   RECORDS PREPARED:
   - Duplicate Remittance Advice (Check Attached)
   - Due Date Tickler
   - Register of Invoices Received
2. Posting vendors' ledger.
   RECORDS PREPARED:
   - Vendors' Ledger
   - Accounts Payable Journal
3. Posting distribution ledger.
   RECORDS PREPARED:
   - Expense Distribution Ledger
   - Purchase Accounts
   - Distribution Journal (Merchandise and Expense)
4. Paying invoices.
   RECORDS PREPARED:
   - Duplicate Check (with Remittance Advice Attached)
   - Vendors' Ledger
   - Check Register

COMMISSIONS

The major operations are as follows:

1. Recording commissions earned.
   RECORDS PREPARED:
   - Salesman's Statement
   - Salesmen's Ledger
   - Commission Journal

2. Recording payments of commissions.

RECORDS PREPARED:
Salesmen's Ledger
Check Register

GENERAL AND EXPENSE LEDGER POSTINGS

The major operations are as follows:

1. Posting expense ledger accounts.

RECORDS PREPARED:
Expense Ledger Accounts
Proof of Posting—Control Sheet

2. Posting general ledger accounts.

RECORDS PREPARED:
General Ledger Accounts
Proof of Posting—Control Sheet

The forms used under the plan are as follows:

Customers' Statement
Customers' Ledger
Sales Journal
Cash Receipts Journal
Creditor's Remittance Advice
Due Date Tickler
Register of Invoices Received
Vendors' Ledger
Accounts Payable Journal
Distribution Ledger
Purchase Distribution Journal
General Check Register
Salesman's Statement
Salesmen's Commission Ledger
Commission Journal
Check Register
Expense Ledger
General Ledger
Proof of Posting—Control Sheet

Machine Operation—Accounts Receivable

Operation I—Recording Sales and Credit Memorandums in Customers' Accounts

Forms Used:

Customer's Monthly Statement
Customer's Ledger Sheet
Sales Journal

A. *Preparation for Machine Operation*

1. Sort bills in alphabetical order according to customers' names.

2. Take total of bills, which will be compared with machine totals to check clerical accuracy.

3. "Stuff" customers' ledger with bills.

B. *Machine Operation*

1. Place sales journal on the writing platen of the machine, and then insert first customer's ledger sheet and statement, aligning last entries on each.

2. Post bills to customer's statement, ledger, and sales journal at one writing.

3. After posting all bills and removing the last customers' statement and ledger sheet, simply type the totals shown in the adding registers on the sales journal. The machine protects against inaccurate typing. (See Note 1.)

4. Check totals on the Sales Journal with predetermined totals. (See "Preparation for Machine Operation" above.)

Note 1. For each unit entry, the computing device or cross-footer automatically adds Debits to Old Balance and subtracts Credits, indicating New Balance, which clears the cross-footer upon typing the figure indicated. During this operation, figures typed in all columns accumulate in the registers over the columns. Furthermore, a proof register is provided in which the old or previous balances are picked up after each entry. The total in the proof register must, after each entry, agree with that in the old balance register, thus insuring the operator's accuracy in picking up previous balances. This feature applies to all machine operations.

Operation II—Recording Customers' Cash Payments

Forms Used:

Customer's Statement
Customer's Ledger Sheet
Cash Receipts from Customers

A. *Preparation for Machine Operation*

1. Sort cash receipt memorandums or media alphabetically by customers' names.

2. Take totals of the gross amount of cash and discount to be credited customers.

3. "Stuff" customers' ledger with posting media.

B. *Machine Operation*

1. Place cash receipts journal on the writing platen of the machine, then insert customers' Statement and Ledger Sheet, aligning the last entries of each.

2. Type balance of customer's account on ledger, date and amount of remittance, and discount; then type "new balance," "name of customer," and "Proof."

3. After posting of cash receipts is completed and last customer's statement and ledger sheet removed, simply type totals shown in registers onto the cash receipts journal. This is proof of mechanical accuracy of the work. (See Note 1 for further data regarding function of registers.)

4. Check totals shown on cash receipts journal with predetermined totals. (See "Preparation for Machine Operation" above.)

Machine Operation—Accounts Payable

Operation I—Registering Invoices

Forms Used:

Duplicate Remittance Advice (Check Attached)
Due Date Tickler
Register of Invoices Received

A. *Preparation for Machine Operation*

1. Sort incoming invoices in alphabetical order.
2. Calculate and deduct discount.
3. Sort invoices by dates on which they are due for payment.
4. Take totals of gross amounts of invoices and discounts, and

deduct the latter total from the former; the two totals and result are checked by the fourth step under Machine Operation below.

B. *Machine Operation*

1. Place register of invoices received, due date tickler for first discount date, and first duplicate remittance advice on the writing surface of the machine, in the order stated, aligning the last entries on each.

2. Enter complete data in the remittance advice section for all invoices of that date, and insert due date ticklers for subsequent discount dates as required.

3. After entering all invoices, and removing the last remittance advice and due date tickler from the machine, simply type the totals shown in the adding registers onto the register of invoices received. The machine protects against inaccurate typing. (See Note 1.)

4. Check totals shown on register of invoices received with the predetermined totals. (See "Preparation for Machine Operation" above.)

5. File duplicate remittance advices (with checks attached) by discount date in front of due date tickler of that date, the same to be held until the date for payment arrives. (See Operation IV.)

NOTE 2. See Note 1.

OPERATION II—POSTING VENDORS' LEDGER

FORMS USED:

Vendors' Ledger
Accounts Payable Journal

A. *Preparation for Machine Operation*

1. After receipt of goods, sort invoices in alphabetical order.

2. "Stuff" vendors' ledger with invoices.

B. *Machine Operation*

1. Place accounts payable journal on the writing platen of the machine, and then insert the first vendor's ledger sheet.

2. Post invoices in ledger order (if there are any credit memorandums these may be posted with invoices, but post debit memorandums by a separate run).

3. After posting and removing the last vendor's ledger sheet

from the machine, simply type the totals shown in the adding registers onto the accounts payable journal. The machine protects against inaccurate typing. (See Note 1 for further data regarding function of registers.)

Operation III—Posting Distribution Ledger

Forms Used:

Expense Distribution Ledger
Distribution Journal (Merchandise and Expense)

A. *Preparation for Machine Operation*

1. Separate all merchandise purchase invoices from expense purchase invoices; then sort the expense invoices in ledger order.

2. "Stuff" expense distribution ledger with expense purchase invoices.

B. *Machine Operation*

1. Place distribution sheet on writing platen of the machine, and then insert first distribution ledger sheet.

2. Post all merchandise and expense items on invoices. (If invoices show items to be charged to more than one account, after posting to first account affected, check item posted and advance the medium until all items are properly disposed of.)

3. After completing posting of all invoices and removing last ledger sheet, adding registers having automatically accumulated totals for all columns affected; type these totals on the distribution journal. The machine protects against inaccurate typing. (See Note 1 for further data regarding function of registers.)

4. From the distribution journal, prepare totals to be charged to distribution control accounts in the general ledger.

Note 3. The accounts would be affected as follows:

General Ledger:
Debit: Expense Ledger Control
Debit: Purchase Control
Expense Ledger
Debit: Expense accounts

The credit portion of these entries are posted from the purchase journal.

Operation IV—Paying Invoices

Forms Used:

Duplicate Check (with Remittance Advice Attached)
Vendors' Ledger
Check Register

A. *Preparation for Machine Operation*

1. Remove from file duplicate remittance advices (with checks attached) to be paid this day. They will be in alphabetical order. (See Operation I, Registering Invoices.)

2. Check all invoices to be paid against duplicate remittance advices.

3. Mark invoices paid and number of check given in payment.

4. Take total of amount of vouchers to be paid. This will provide check on total bank credit.

5. "Stuff" vendors' ledger with duplicate remittance advices

B. *Machine Operation*

1. Place check register and vendor's ledger sheet on writing platen of the machine, and then insert first duplicate check, folding the latter at the perforation on the right of the Old Balance column.[1] This will align the net amount of the check with the Debit column of the vendors' ledger and the Amount of Check column of the check register.

2. Type balance of Vendor's Ledger account, date, check number, and amount of checks, and then type discount, new balance, name of vendor, and proof.

3. After completing the writing and posting for all accounts affected, and removing last duplicate check and ledger sheet, adding registers having automatically accumulated totals for all columns affected, type these totals on the check register. The machine protects against inaccurate typing. (See Note 1 for further data regarding function of registers.)

4. Separate original and duplicate checks (with remittance advices attached). Original is ready for signature, and duplicate is filed in numerical order by check number.

[1] Form of Check with voucher attached shown on page 316.

Machine Operation—Commissions

Operation I—Recording Commissions—Earned

Forms Used:

Salesman's Statement (Check Attached)
Salesmen's Ledger
Commission Journal

A. *Preparation for Machine Operation*

1. Calculate the amount of commission due on each sale and indicate the amount on the invoice.

2. Sort the invoices alphabetically by salesmen's names.

3. Take total of amount of commission to be credited to salesmen.

4. "Stuff" salesmen's ledger with posting media.

B. *Machine Operation*

1. Place the salesmen's commission journal on the writing platen of the machine; then insert salesmen's ledger sheet and statement, aligning the last entries on each.

2. Enter data on the statement from the invoices for all commissions affecting the account.

3. Any commissions to be deducted from the salesmen's accounts because of goods returned should be entered.

4. After entering all commissions and deductions and removing the last salesmen's statement and ledger sheet from the machine, simply type the totals shown in the adding registers onto the commission journal. The machine protects against inaccurate typing.

5. Check totals shown on the commission journal with predetermined totals (see "Preparation for Machine Operation" immediately above).

Operation II—Recording Payments of Commissions

Forms Used:

Check (Salesman's Statement Attached)
Salesmen's Ledger
Check Register

A. *Preparation for Machine Operation*

1. Salesmen's statements and ledger sheets are arranged in alphabetical order.

B. *Machine Operation*

1. Place check register and first salesmen's ledger sheet on writing platen of machine, and then insert the corresponding duplicate check, folding the latter at the perforation on the right of the Old Balance column. This will align the amount of the check with the proper column of the salesmen's ledger sheet and check register.

2. Type balance of Salesmen's Ledger account, date, check number, and amount of check. Then type new balance, name of salesman, and proof.

3. After completing the writing and posting for all accounts affected, remove the last check and salesmen's ledger sheet. Adding registers have automatically accumulated totals for all columns affected; type these totals on the check register. The machine protects against inaccurate typing.

4. Separate original and duplicate checks (with salesmen's statements attached). Original is ready for signature, and duplicate is filed in numerical order by check number.

Machine Operation—Expense Ledger[1]

Operation I—Posting

Forms Used:
Commissions Accrued—Controlling Account
Posting Proof

A. *Preparation for Machine Operation*

1. The commission journal and check register are used for the posting media.

B. *Machine Operation*

1. Place the posting proof on the writing platen of the machine, and insert the ledger sheet for the first account affected. Type the old balance from the ledger sheet into the Old Balance column.

[1] For purposes of illustration commission expense control and accounts are presented. The same procedure would apply to other classes of expense.

Then write the name of the Journal from which posting is made, the amount to be posted, the new balance, the name of the item which is posted, and the proof.

2. When the posting of all accounts in the expense ledger is completed, simply type the totals appearing in the registers into their respective columns.

Machine Operation—General Ledger

OPERATION I—POSTING

FORMS USED:

General Ledger—Controlling Account
Posting Proof

A. *Preparation for Machine Operation*

1. Collect all general ledger posting media.

B. *Machine Operation*

1. Place the posting proof on the writing platen of the machine, and insert the ledger sheet for the first account affected. Type the old balance from ledger into the Old Balance column. Then write the name of the journal from which the posting is made, the amount to be posted, the new balance, the name of the item which is posted, and the proof.

2. When the posting of all accounts in the general ledger is complete, simply type the totals appearing in the registers into their respective columns.

CHAPTER XVI

STATISTICAL AND MISCELLANEOUS APPLICATIONS

Flexibility of Mechanical Accounting Devices to Statistical Conditions.—An analysis of business facts from any desired viewpoint can be readily made with the aid of mechanical accounting devices, especially those that employ the use of punched cards. This method gives required data in such detail that executives of organizations are enabled to determine quickly and accurately the proper methods of procedure, as it affords a basis of recording results which will facilitate the solution of many difficult problems.

The Punched Card Method.—Each punched card form for use on electrical tabulating equipment may be designed to meet definite statistical conditions, permitting a rapid means of making analyses and securing such detailed information which, although valuable, would be impracticable to secure under pen methods. The punched card method of compiling statistics has been applied to many problems outside the domain of accounting. A volume alone could be written on statistics and statistical applications. As there are many statistical conditions to which the electrical tabulating equipment may be applied advantageously, an attempt to summarize all statistical conditions to which it may be applied would prove an endless task by reason of its wide and varied range of possibilities. The diversified industries to which the electric tabulating and accounting machine method may be effectively applied include manufacturers, wholesalers, jobbers, retailers, department stores, railroads, steamship companies, public service companies,

financial institutions, insurance companies, municipal, state and federal governments, etc.

Applications Discussed in this Chapter.—To even attempt to explain the required routines in detail as applied to specific applications of each of the above industries in the space allotted for this particular chapter would be impossible. However, the authors have chosen four electric tabulating applications that should prove interesting to the reader, particularly from the standpoint of the manner in which statistical data are collected and machined, and made the basis of reports that are prepared accurately and in a minimum of time. These applications are as follows:

1. Registration and statistics covering premiums, additions, cancellations and rebates for fire insurance companies.
2. Registration and statistics covering losses for fire and casualty insurance companies.
3. Accounting and statistical requirements of automobile finance companies of all principal phases of motor finance.
4. Statistical requirements of corporate accounting.

Registration and Statistics Covering Premiums, Additions, Cancellations, and Rebates for Fire Insurance Companies.—The first application is presented particularly for executives intimately connected with the accounting of the business of fire insurance. It is a fundamental requirement that "daily reports" be transcribed on punched cards as soon as they have been referenced with the necessary information required for record purposes. Recognizing the fact that punched cards are used by some of the progressive insurance companies for statistical purposes, a system based upon a particular punch card design (Figure 83) that will carry all the required information for the policy register (Figure 84) is explained below. By employing a printer-tabulator, a machined record is

produced that is customarily written by pen by registry clerks in many companies.

Scope of the Plan.—The following procedure will produce effective results. The plan may be readily modified to meet any particular condition in an office where such a system is contemplated.

1. The practice generally in vogue in fire insurance companies' offices when daily reports (known as "dailies") reach the home office, is to indicate their receipt by stamping them with date stamp and registering them in numerical sequence (blotter system).

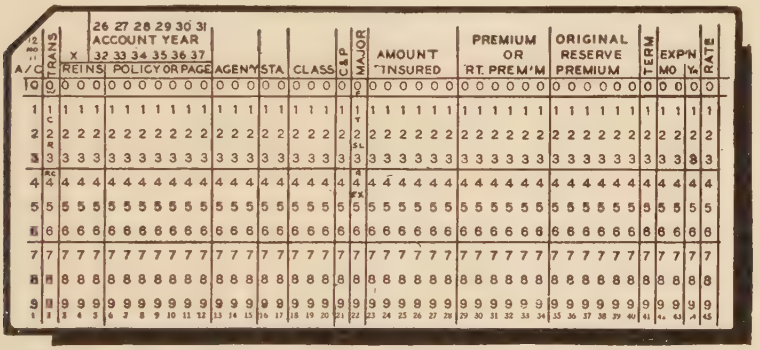


Figure 83. Card Used for the Tabulation of Premiums, Additionals, Cancellations, and Rebates

2. Dailies are then sent to mapping and classifying department.

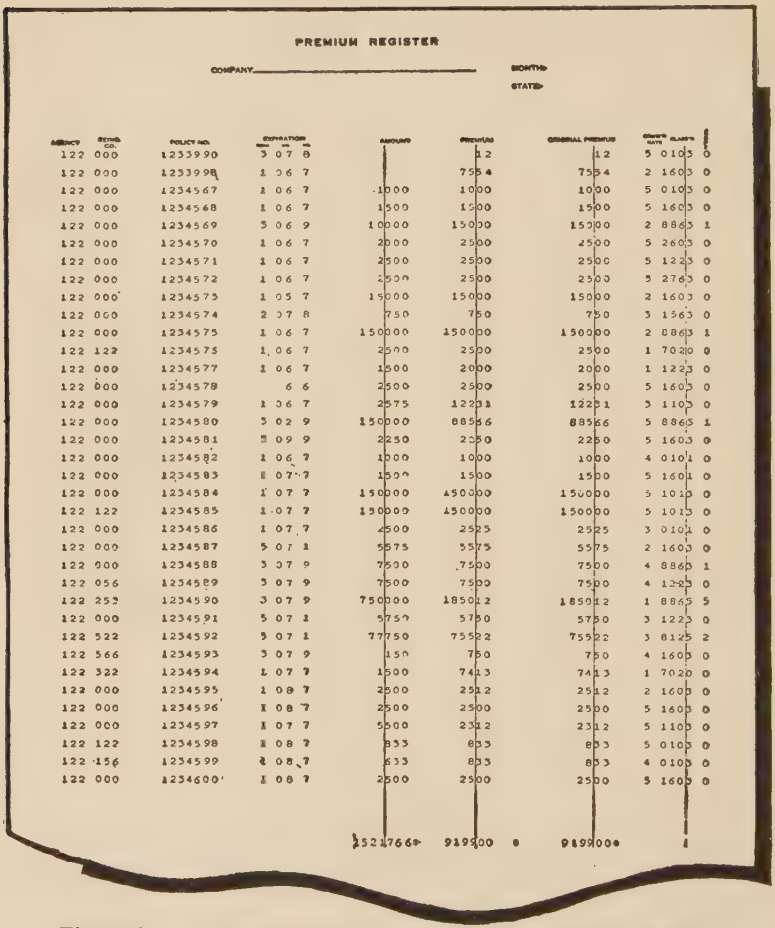
3. Dailies then proceed to underwriting department for examination and approval, etc., and the indication of reinsurance in whole or in part is made by the underwriters.

4. Dailies, without regard to agencies, states, etc., are sent to the statistical department, where cards are produced as illustrated in Figure 83. Invariably, the total of premiums or returned premiums is established in the underwriting or accounting department each day of the groups of dailies sent to the statistical department where this control is used in balancing, as mentioned in paragraph six below.

5. All cards are mechanically verified with a verification ma-

chine by an operator other than the clerk who originally punched the cards.

6. All cards are balanced to controls for that day by tabulating them, thus insuring accuracy in money columns before releasing



PREMIUM REGISTER

COMPANY_____ MONTH

STATE

AGENCY	BRANCH CO.	POLICY NO.	EXPIRATION	AMOUNT	PREMIUM	GENERAL PREMIUM	CLASS
122 000		1233990	3 07 8		12	12	5 0103 0
122 000		1233998	1 06 7		7554	7554	2 1603 0
122 000		1234567	1 06 7	10000	10000	10000	5 0103 0
122 000		1234568	1 06 7	1500	1500	1500	5 1603 0
122 000		1234569	3 06 9	10000	15000	15000	2 8863 1
122 000		1234570	1 06 7	2000	2500	2500	5 2603 0
122 000		1234571	1 06 7	2500	2500	2500	5 1223 0
122 000		1234572	1 06 7	2500	2500	2500	5 2763 0
122 000		1234573	1 05 7	15000	15000	15000	2 1603 0
122 000		1234574	2 07 8	750	750	750	5 1563 0
122 000		1234575	1 06 7	150000	150000	150000	2 8863 1
122 122		1234575	1 06 7	2500	2500	2500	1 7020 0
122 000		1234577	1 06 7	1500	2000	2000	1 1223 0
122 000		1234578	6 6	2500	2500	2500	5 1603 0
122 000		1234579	1 06 7	2575	12231	12231	5 1103 0
122 000		1234580	3 02 9	150000	88566	88566	5 8863 1
122 000		1234581	3 09 9	2250	2250	2250	5 1603 0
122 000		1234582	1 06 7	1000	1000	1000	4 0101 0
122 000		1234583	1 07 7	1500	1500	1500	5 1601 0
122 000		1234584	1 07 7	150000	150000	150000	5 1013 0
122 122		1234585	1 07 7	150000	150000	150000	5 1013 0
122 000		1234586	1 07 7	2500	2525	2525	3 0101 0
122 000		1234587	5 07 1	5575	5575	5575	2 1603 0
122 000		1234588	3 07 9	7500	7500	7500	4 8863 1
122 056		1234589	3 07 9	7500	7500	7500	4 1223 0
122 252		1234590	3 07 9	750000	185012	185012	1 8863 5
122 000		1234591	5 07 1	5750	5750	5750	3 1223 0
122 522		1234592	5 07 1	77750	75522	75522	3 8125 2
122 566		1234593	3 07 9	150	750	750	4 1603 0
122 322		1234594	1 07 7	1500	7413	7413	1 7020 0
122 000		1234595	1 08 7	2500	2512	2512	2 1603 0
122 000		1234596	1 08 7	2500	2500	2500	5 1603 0
122 000		1234597	1 07 7	5500	2312	2312	5 1103 0
122 122		1234598	1 08 7	833	833	833	5 0103 0
122 156		1234599	1 08 7	633	833	833	4 0103 0
122 000		1234600	1 08 7	2500	2500	2500	5 1603 0
				3521766	919900 0	919900 0	

Figure 84. Premium Register Produced on Tabulating Machine

dailies. It is well to stress the fact that it is desirable to do the punching of a day's dailies each day, thus permitting them to be filed promptly.

7. Dailies having reinsurance notations are sent to the reinsurance department after balance has been affected.

8. All other dailies are sent directly to the file. The file clerk is not to file any dailies unless statistical department stamp appears thereon. Indication by reinsurance department that reinsurance has been placed must also be noted by file clerk before filing dailies having reinsurance notations.

9. All cards are sorted daily to agencies by policy numbers and are filed behind guides for each agency by states.

10. At the end of an accounting period, the cards are taken from the file and are listed in the printer-tabulator by agencies by policy numbers as illustrated in the register sheet.

11. The cards and register sheet then proceed to the accounts checkers, who check the sheet as ordinarily, ruling out those not on account, as in the case of regular hand-written registers.

12. Cards for those items which appear on the register but not on the accounts, are returned to the statistical department to be held over for the following month's registering. Invariably such items appear on the next month's account from the agent.

13. Dailies for items not on register sheet which might indicate the non-receipt of daily reports, are searched for, and if found, cards are punched from them and added to the register. Such dailies, however, must not bear stamp impressions of the statistical department, and should in no case reach the file. In the event that dailies are not found, balance cards (dummies) are punched for each item appearing on account and indicated on register sheet.

14. When cards have been checked as correct and register is so referenced, the cards are returned to the statistical department where they are run through the printer-tabulator for proof by agencies for each state or underwriting division to insure accuracy. Check is made in total to each state in synopsis journal, although as previously stated, each agency is listed but not each item in each agency. This procedure gives an agency record of totals to the statistical department as well.

15. Full control of month's premiums and return premiums is checked by the statistical department before proceeding to subsequent tabulations.

The registration of assured names may be eliminated under this method, as little reference to this information is made. The insertion of names involves a considerable cost, but the fact that mechanical registration does not afford the names of assured does not present a problem in this particular phase of the routine. (See illustration of the premium register, Figure 84.)

Recording Registry Information on Forms in Continuous Strips.—Continuous form tabulation paper may be used when printing the registry information, and by clipping the various agencies from this continuous strip and pasting them in their respective positions in a register of agencies another means of registration is provided. This register may be headed on each page, thus eliminating the necessity of heading each strip, inasmuch as the spacing on the printer-tabulator sheet is made to conform to the standard columnar arrangement of the register. This scrap-book idea affords the opportunity of having all of an agent's items in one place in the register without having to remove a sheet and reintroduce it into the printer-tabulator for subsequent entries. The adoption of this method results in greater speed in registration work.

Recording Registry Information on Uniformly-Sized Sheets.—A second method which has some appeal is printing the information on uniformly-sized sheets headed to suit requirements, and listing the items numerically for each of the agencies, which also appear in numerical sequence by state or underwriting division. This method permits the filing of each month's register sheets in one place, and anyone wishing to refer to a registered item must first know the month of account. Of course, one or more agencies appear on a sheet, properly spaced apart, under this method, to conserve the paper and permit smoother listing on the printer-tabulator, which reduces the elapsed time for such work.

Recording Registry Information to Abstract Loose-Leaf Sheets.—A third method is to abstract loose-leaf sheets from the register binder for each agent and print the new registrations under the last month's items. This is obviously a slower method from the standpoint of time elapsed in registering because of the time lost in removing sheets from binder, inserting in tabulator, and then removing sheet and replacing it in the binder again. This method finds favor, however, in some offices where a small volume of business is handled.

Time Saved in Method of Recording.—It is estimated that from two to four weeks may be saved in definitely closing out, inasmuch as the cards are already punched and the chance of dailies being missing when checking is begun is minimized. Where tabulating equipment has been adopted by fire insurance companies, maximum production is not generally obtained due to punching from accounts, and the referencing of these accounts by checkers as to classification, etc., which involves considerable time which could be devoted more profitably, not to mention the errors coincident with the transcribing of such information, rather hurriedly, to the accounts from dailies, or in some instances, from registers for use as media of the punch clerk in punching the cards.

The foregoing outline indicates the importance of beginning the punching of cards as soon as possible in the routing of original records, and producing reference records by means of the printer-tabulator, which permits the preparation of almost any required detail, uniformly, expeditiously, and economically. In every instance in fire insurance offices, it is found that there is not only greater efficiency in registering mechanically, but also a considerable saving of clerk hire can be effected. All information for current and annual requirements of the home office or the insurance departments can be obtained from the cards after they have served to produce the register information as outlined.

Registration and Statistics Covering Losses for Fire and Casualty Insurance Companies.—The second application illustrates the procedure of handling the most disturbing element in many of the loss departments of the fire and casualty insurance companies. The fact that it is not possible to obtain, at a moment's notice, an absolute and properly controlled statement of outstanding losses for any unit or section of the files without having to wade through all the records, which are quite cumbersome to handle and keep up to date, is a very serious disadvantage. Very often a request of the management to produce an agent's statement of outstanding losses means hours, and often days, to the loss of the accounting force with no positive assurance that what has been developed is absolutely correct. This is occasioned by the fact that loss registers are made histories of the cases, and it is necessary to make reference to many books or sheets to obtain the desired information.

A request of this type is usually prompted by the need to arrive at contingent commissions at stated periods. In consequence, the following system of punched cards has been developed which will not only promptly take care of such important and spasmodic requests for balanced outstanding information, but will also serve to produce a register of losses reported in the accounting period and provide a reference file as well.

As soon as advices of losses are received and claim numbers are assigned, two cards of different colors are punched simultaneously as shown in the illustration in Figure 85. It is well to punch the cards from the advices or pockets, as the case may be, in claim number order, the reason for which is described in a later paragraph. Mechanical verifying should be resorted to before these cards are referenced with the written information as noted on the card. Obviously, this is to prevent rewriting such information in the event of incorrect punching. Having punched and verified the cards, they are run through the tabulator for totals of gross and reinsurance estimated losses.

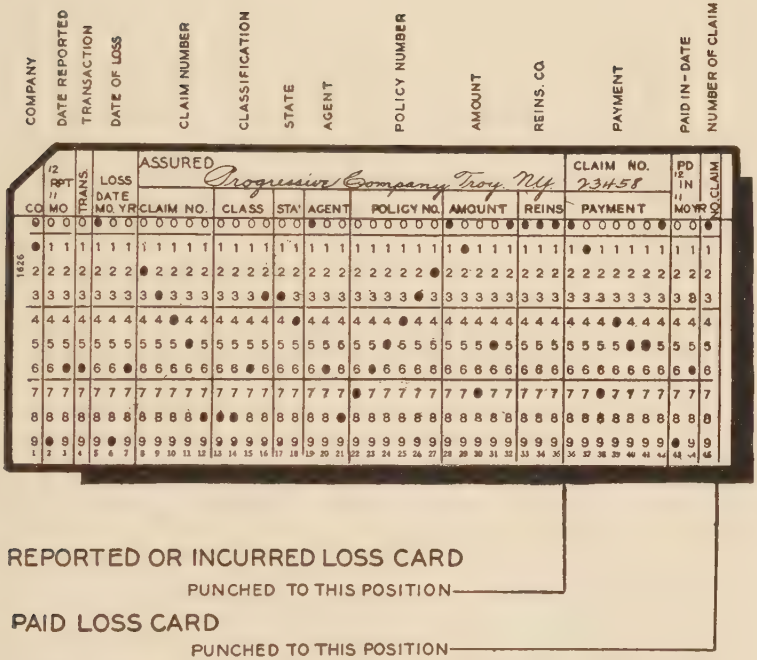


Figure 85. Used for Tabulating Card, Reported or Incurred Loss and Paid Loss

LOSS REGISTER

SHEET

COMPANY_____

MONTH- September 19

CLASS-

-DEPARTMENT- New York

CLAIM NUMBER	TRANSACTION CODE	REINS. CO.	AGENCY	ESTIMATE (WHOLE $)	CLASS'N	SPECIAL
23456	6	000	100	750	103	0
23457	6	000	100	500	1603	0
23457	8	789	100	250	1603	0
23457	8	877	100	125	1603	0
23458	6	000	68	1750	8863	1
23459	6	000	99	885	103	0
23459	8	122	99	443	103	0
23460	6	000	1	150	1723	0
23460	8	022	1	75	1723	0
23461	6	000	2	1500	8863	2
23461	8	111	2	750	8863	2
23462	6	000	2	15000	8863	5
23462	8	122	2	7500	8863	5
23462	8	789	2	2500	8863	5
23463	6	110	2	250	103	0
23463	8	110	2	150	103	0
23464	6	000	68	1000	1603	0
23465	6	000	83	1500	4463	0
23465	8	022	83	750	4463	0
23466	6	000	90	85	103	0
23467	6	000	30	1250	1103	0
23467	8	000	30	625	1103	0
23468	6	000	100	833	223	0
23469	6	000	111	750	6123	0
23470	6	000	88	1500	1103	0
23470	8	666	88	750	1103	0
	6			27703	•	
	8			13918	•	

NOTE- TRANSACTION - 6 - GROSS LOSS
8 RECOVERY

Figure 86. Tabulating Machine Sheet—Loss Register

Checking to daily control is the next step. The two sets of cards having been balanced, one set is placed in outstanding loss file by claim numbers, in which order the cards should be without the need of sorting. The other set of cards is retained and accumulated daily until the close of the month, and register of these is made for office record purposes for the whole month at one time, or this can be accomplished at lesser intervals if desired.

This method affords the opportunity of eliminating the hand-posting of reported loss information and replacing such records with a printed-tabulated record as suggested by the accompanying illustration in Figure 86. Policy numbers may be added if desired, as such data have been cared for in the design of the card illustrated. Registering at the rate of 75 items or lines per minute, the vital figure information from the mechanically verified punched cards will be found an efficient operation. This is the listing speed which is approximately half that of tabulating and printing speed.

The name of assured, although not a necessary part of the register, may be placed on a printed-tabulated sheet by providing sufficient space for this information. This will involve a secondary operation by plain writing equipment or other method, and the punched cards so referenced will be the media from which to obtain such information. All information for loss reserve purposes can be obtained before the cards are filed in reported or incurred loss file for future reference purposes.

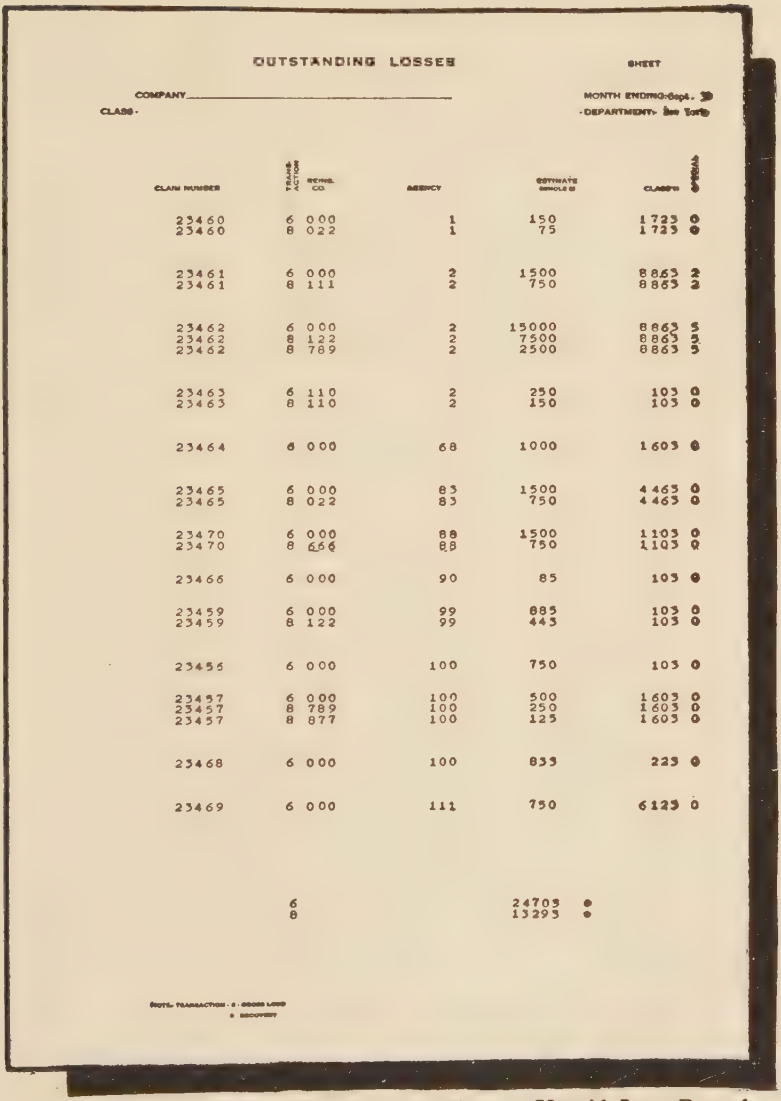
The adjustment of estimates is a feature of operation of the card system that is easily handled by abstracting from the files the items adjusted, repunching them, preparing printed statements of them, and developing the differences for charging to or deducting from the loss reserve sheet. The use of the electric duplicating key punch will at once afford smooth and correct repunching of such items to the position of estimate. Replacing new cards in open files will place the outstanding

figures on the proper basis. This will be found economical for those who are constantly changing their estimates and wish to take advantage of every dollar on the loss reserve.

As advices of payments are received and drafts or checks are drawn, the cards representing the estimated losses are withdrawn from outstanding file and extended as noted in the illustration in Figure 87. Balancing of the cards daily or at other arranged periods can be effected and statements of paid losses and expenses can be tabulated when the month is closed. In some instances, the cash disbursements records may be advantageously printed from these. Savings on original estimates, when payments are finally made, can be established in a positive way simultaneously with the tabulations of the paid cards. This is possible because the estimate and the payment are on the same card. Since this is a factor in determining loss reserves, it will be found a very efficient method.

When advice of the fact that a claim is not to be entered for a loss is received, the card in outstanding file is removed and referenced by punching a symbol to that effect. Such estimates, therefore, are made part of the tabulation of paid losses, thus insuring credit on reserves.

The outstanding or unpaid losses record is the most important feature of the system just outlined. Its flexibility and the fact that balanced control is always possible, are other worthwhile advantages. After all cards are abstracted from file because of payments, or no claims, the remaining cards are sorted to agencies or other divisions. The printing of each item in file as at the end of each month will afford a record for reference purposes, and will answer all questions for the management with regard to the condition of any agency or division, etc. It will be found invaluable to be able to present a printed register of outstanding losses (Figure 89) at the end of each month or quarter, and the use of such a record will be manifest to those who have found the difficulties which come from the



OUTSTANDING LOSSES

SHEET

COMPANY

MONTH ENDING Sept. 30

CLASS

DEPARTMENT New York

CLAIM NUMBER	TRANS. TYPE	REINS. CO.	AGENCY	ESTIMATE WHOLE $	CLASS	SPECIAL
23460	6	000	1	150	1723	0
23460	8	022	1	75	1725	0
23461	6	000	2	1500	8863	2
23461	8	111	2	750	8863	2
23462	6	000	2	15000	8863	5
23462	8	122	2	7500	8863	5
23462	8	789	2	2500	8863	5
23463	6	110	2	250	103	0
23463	8	110	2	150	103	0
23464	6	000	68	1000	1603	0
23465	6	000	83	1500	4463	0
23465	8	022	83	750	4463	0
23470	6	000	88	1500	1103	0
23470	8	666	88	750	1103	0
23466	6	000	90	85	103	0
23459	6	000	99	885	103	0
23459	8	122	99	443	103	0
23456	6	000	100	750	103	0
23457	6	000	100	500	1603	0
23457	8	789	100	250	1603	0
23457	8	877	100	125	1603	0
23468	6	000	100	833	223	0
23469	6	000	111	750	6123	0
	6			24703		
	8			13293		

NOTE: TRANSACTION - 6 - GROSS LOSS
8 - RECOVERY

Figure 87. Tabulating Sheet—Outstanding or Unpaid Loss Record

operation of a "history register." Statements of assumed or ceded losses by companies can also be speedily obtained.

Accounting and Statistical Requirements of Automobile Finance Companies.—The accounting and statistics applicable to the requirements of the financing division of a large automobile manufacturer will next be dealt with. The system has produced very desirable results, particularly considering the fact that the activity of the firm using it includes the financing of its own make as well as other makes of automobiles which are sold on the installment plan throughout the United States and Canada. The statistics developed are briefly divided into the following groups:

1. Retail, where one car is financed on one note.
2. Wholesale, where more than one car is financed on one note.
3. Financial, company's rediscount statistics.
4. Foreign finance statistics.
5. Statistics of repossessed cars.
6. Statistics of car losses and recoveries.

Use of the Retail Card.—The retail card illustrated in Figure 88 is punched from retail statistical media which are sent to the home office daily from branches located throughout the United States and Canada. These statistical memorandums, each representing the financing of one automobile, are received in the statistical department where they are examined, the percentage of down payment noted thereon, and passed to the tabulating department for punching. The data indicated on the card illustrated (Figure 88) reflects all the data the statistical memorandums referred to contain. A daily volume report accompanies all statistical memorandums received from branches. All coding, namely, class of car, state, unit (make of car), and the various installment plans, is performed by key punch operators who are thoroughly familiar with these data.

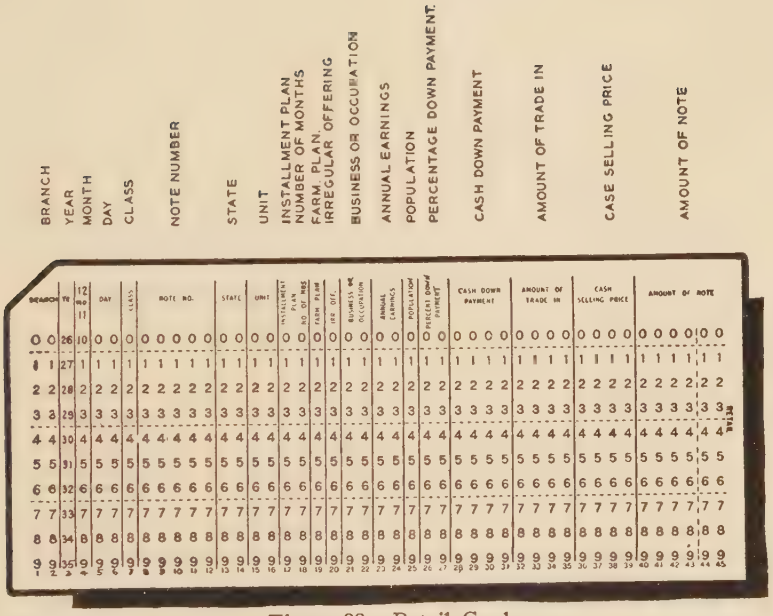


Figure 88. Retail Card

Columns one to six, i.e., Branch Number, Year, Month, and Day, are gang punched for the cards to be used for each branch as indicated by the statistical memorandums received. After punching, the cards are immediately filed by branch and day. This order facilitates balancing as to amount against the control figures on daily volume reports of each branch which are bound in similar order for ready reference during tabulation. All branch returns are required to be on hand at the home office by the tenth of each month, and all card punching and checking of branch returns must be completed not later than the twelfth of each month.

From the retail card illustrated in Figure 88 the following reports are compiled.

1. Volume Report. Cards of each branch are sorted by class and unit and are run through the tabulator for a count of cards (each card representing a finance note) and a total money value of notes. Types of cars other than those manufactured by the company using this system are analyzed as a miscellaneous group.

2. Analysis of Irregular Offering. The term "irr. off." refers to any payment other than the regular one-third down and twelve months to pay. There are six classes of irregular offerings. Regular offering cards are not punched in the twentieth column. By sorting, therefore, to the irregular offering column, the irregular offerings are segregated into their respective classes and tabulated for count of notes, and total note value in the branches.

In conjunction with the tabulation just referred to, all long-term irregular offerings are separated, sorted to installment (number months), and tabulated to show count of notes and amount of branch, class, and installment. Installment groups under thirteen months are analyzed together. It must be clearly borne in mind that this report is compiled from only those irregular offering cards representing term payments.

3. Analysis Total Retail Offerings. The cards for each branch from previous sortings are automatically positioned in two groups, i.e., regular and irregular offerings. Under each group the cards are sorted to class (new and used cars), installment, and percentage amount divisions. Several tabulations are necessary to yield this report showing:

1. Count of notes.
2. Amount of trade-in.
3. Cash selling price.
4. Amount of note.

By

1. Branch.
2. Offering.
3. Class.
4. Installment.
5. Percentage amount group.

These figures are posted to large control sheets by hand, each sheet representing a specific percentage down payment group (of which there are eleven) to the branches, and later are summarized by all branches geographically. The number of "trade-ins" are counted manually by reason of their being few in number. By means of punching a 1 to indicate a trade-in, in any of the columns from twenty-one to twenty-five which are not being used under the present plan, a quick tabulation is afforded.

The monthly report developed from the retail cards exhibits the volume of business by branches and territory. These reports are compiled in such an order as to reduce the sorting steps as far as possible, i.e., all sorting dovetails conveniently from one report into the other. The count of notes and their amount by branches is one of the important statistical requirements of the system, for the reason that the finance values of these notes vary in different branches. The compilation of the reports referred to comprise the major part of the monthly tabulation.

Use of the Wholesale Card.—Since every retail note represents the financing of one car only, the wholesale card illustrated in Figure 89 represents any number of cars of similar make financed on one note. A "1" is punched in the Number of Notes column simply for tabulating purposes. The number of cars financed on each note is punched in column thirty-eight. For quantities over nine cars, two cards are punched. Wholesale

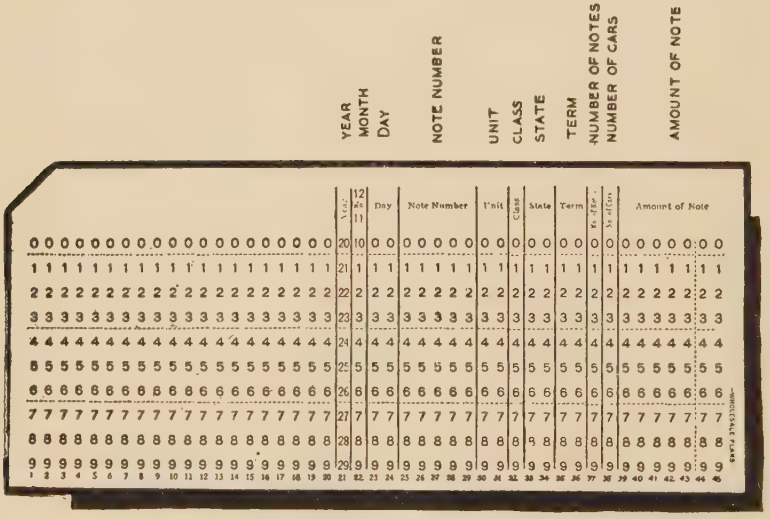


Figure 89. Wholesale Card

cards are checked to the daily volume recapitulation control figures previously mentioned, and are filed by branches apart from the retail cards.

Preparation of the Volume Report.—Wholesale reports developed from the wholesale cards are as follows:

Cards for each branch are sorted to class, unit, and are tabulated to give number of notes, number of cars financed, and amount of notes. This report is similar to the volume report developed from the retail cards previously explained. The cards are next

sorted to territory and are tabulated for number of notes, cars, and amount.

From both the retail and wholesale monthly volume reports are punched master cards of the type illustrated in Figure 90. At the end of every month these cards are proved against

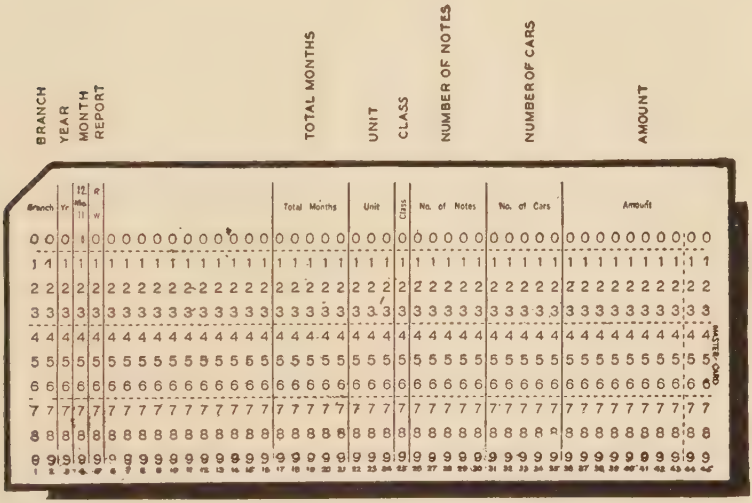


Figure 90. Master Card

monthly report sheets and are filed by branches. Tabulations of these cards are made semi-annually, giving for each branch a complete accurate summary of six months' business, showing numbers of notes issued, number of cars financed, and amount of notes.

Tabulation of Financial Sales.—The card illustrated in Figure 91 is used in connection with financial sales. The company employing the system being dealt with issues 4½ % short-term notes to banks. The sales of these notes are analyzed from this card form for each note issued. Sales memorandums

dispatched from all branches are partially coded in the financial sales department and are passed to the tabulating department for punching. Cards are checked against control figures in financial sales department and are filed by zone or district.

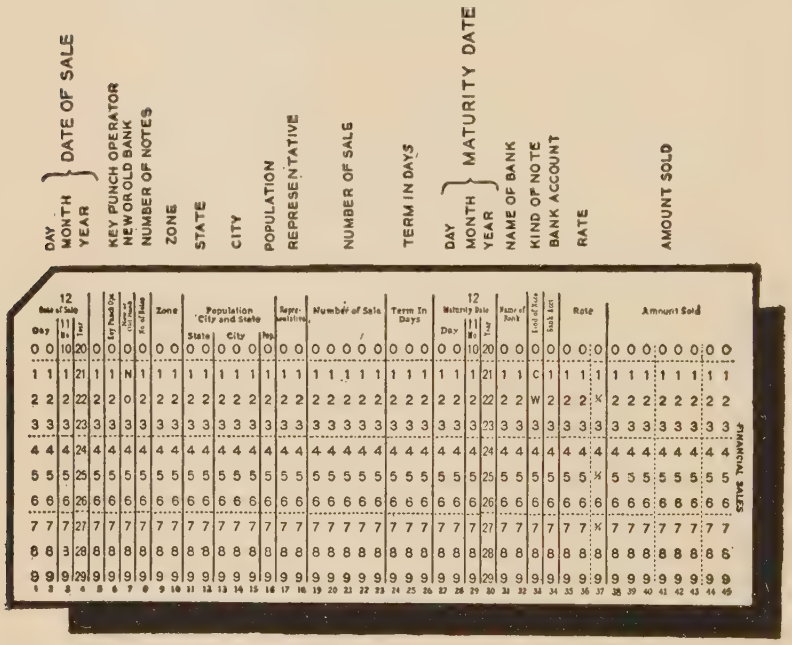


Figure 91. Financial Sales Tabulating Card

The following monthly reports are compiled from financial sales cards:

1. Each zone or district is sorted by kind of note and tabulated for number of sales and amount of sales. There are three classes of notes, i.e., collateral, wholesale, and special.

2. Districts are sorted and tabulated by bank account and by representatives to show number of sales and amount.

3. Districts are sorted and tabulated by representatives and

new and old banks to present another classification of data in the second report above (Analyses of Irregular Offerings).

4. The final sorting and tabulation is by bank account and discount rate to show number of sales and amounts. These data are available about the twentieth of each month after the wholesale and retail notes have been analyzed.

Tabulation of Foreign Financing.—The card illustrated in Figure 92 is used in connection with foreign financing. All

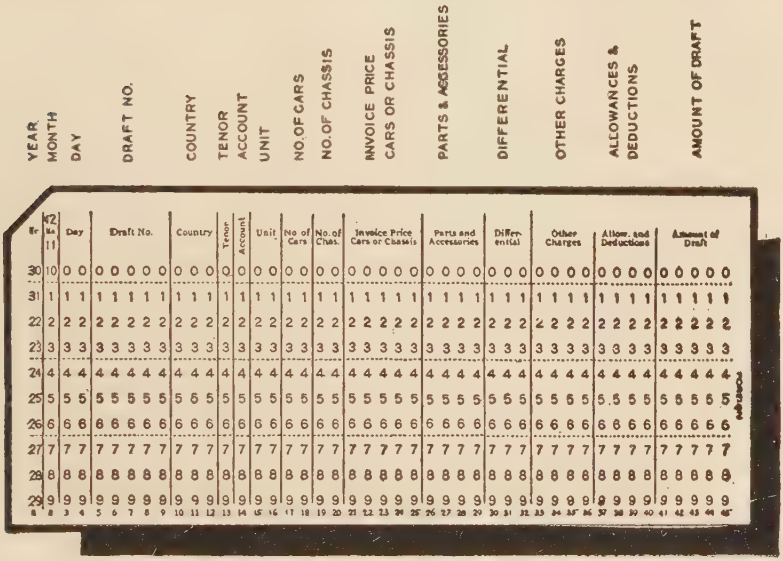


Figure 92. Tabulating Card—Foreign Sales

money values shown on this card are punched to nearest dollar. Cards are punched from data sent in by foreign offices, and are coded by the foreign department of the home office in the same manner as cards are coded by the financial sales department previously explained. Owing to the uncertainty of incoming reports from foreign countries, the report compiled from this card is completed after all other reports, previously referred to, have been prepared. All cards are filed by account

number. Each account is sorted by unit and "tenor" (kind of paper or bill of exchange) for a tabulation of the various money values in dollars only. This is accomplished in two tabulations. A study of the tabulation card illustrated will give the reader the extent of the statistical data obtainable, and the reports that may be developed therefrom.

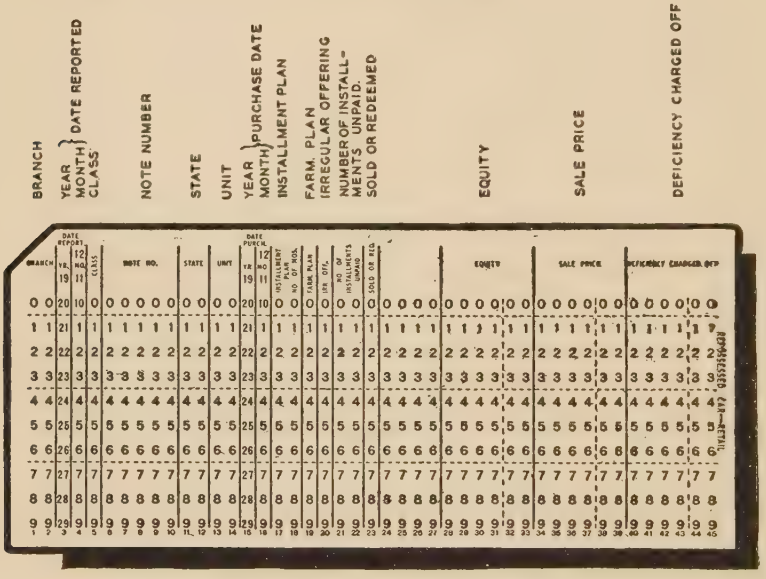


Figure 93. Repossessed Car Card—Retail

Preparation of Reports.—Every month a report is received from each branch giving the detail information of the cars repossessed by the finance company. Repossession means the taking back of a car in lieu of payment on the note where the balance has become delinquent. The card illustrated in Figure 93 cares for the statistics required on repossessed cars.

The machine operator punches the information from branch reports, the content of which is the same as the data shown by the illustration. The column headed Sold or Redeemed refers to: Sold—when the dealer refuses to redeem the car, a

1 is punched; Redeemed—when the purchaser redeems car for balance of the note, a 3 is punched. The equity field of the card stands for the amount owing on the note. The deficiency field of the card refers to the amount of loss sustained on a car sold. All cards are proved as to amounts against predetermined control figures established by the reports which are received and filed by branches. Cards for each branch are sorted into redeemed and sold classifications. Two reports are compiled as follows:

1. Cards for redeemed cars are sorted to class and offering by branches, and are tabulated for the number of cars and amount of equity.

2. Cards for cars sold are sorted by class and offering by branches, and are tabulated for the equity amount, sale price, and deficiency charged off. The sale price plus the deficiency should at all times equal the amount of the equity.

In order that branches may receive proper credit for losses in transactions referred to above, credit memorandums for such losses are sent to the home office credit department where they are first passed upon. From these approved records two cards are punched, i.e., manila cards with "charge off" amount, and red cards with recoveries. Referring to the card illustrated (Figure 94) which is used for these statistical data, the field indicating "kind of loss" represents such losses as confiscation, conversion, and collision, which are covered by branch insurance made so from a sinking fund created for each branch.

The reports compiled from charge off and recovery cards are as follows:

1. Charge Offs. All manila cards of the design illustrated in Figure 94 are sorted and tabulated by branch and kind of loss, i.e., the three kinds of losses referred to above. Cards are further segregated into new and used cars, regular and irregular offerings, and tabulated for amount of charge offs.

2. Recoveries. All red cards of the design illustrated in Figure 94 are sorted and tabulated in a similar manner for recovery amount.

The remainder of the cards which have been sorted at prior operations, i.e., into various loss groups, are further sorted by branch, class, and offering, and are tabulated for amount of charge offs.

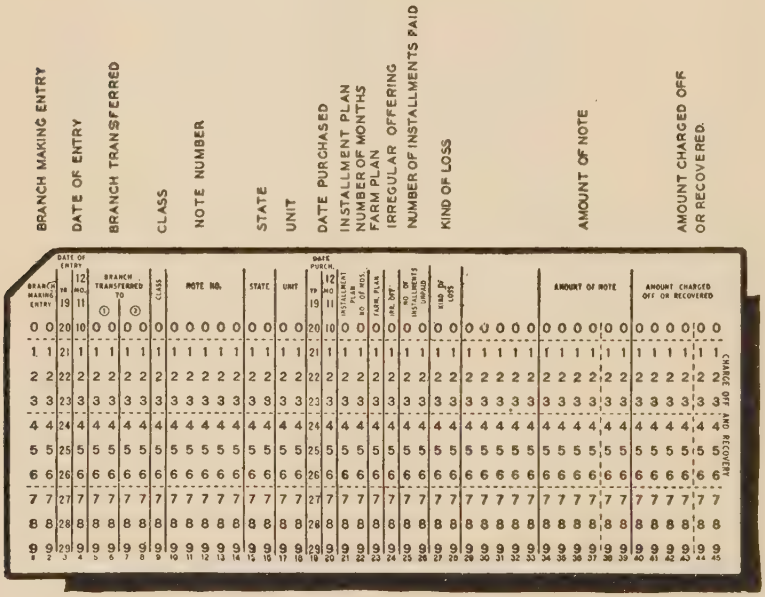


Figure 94. Charge-Off and Recovery Card

The foregoing systems exemplify the quickest and most dependable means of analyzing such facts as develop in everyday operations of not only insurance and finance companies, but manufacturing, mercantile, transportation, governments, and other businesses as well.

Statistical Requirements of Corporate Accounting.—One of the many interesting applications of mechanical accounting equipment that have been applied to statistical conditions is the

adoption of the flat-printing platen tabulating machine to maintaining stockholders' statistics. In the system that is to be outlined, one machine is utilized to obtain the required analysis with a personnel of six people. Considering the voluminous detail surrounding the requirements of these accounting conditions, it is remarkable that so small a clerical unit may be

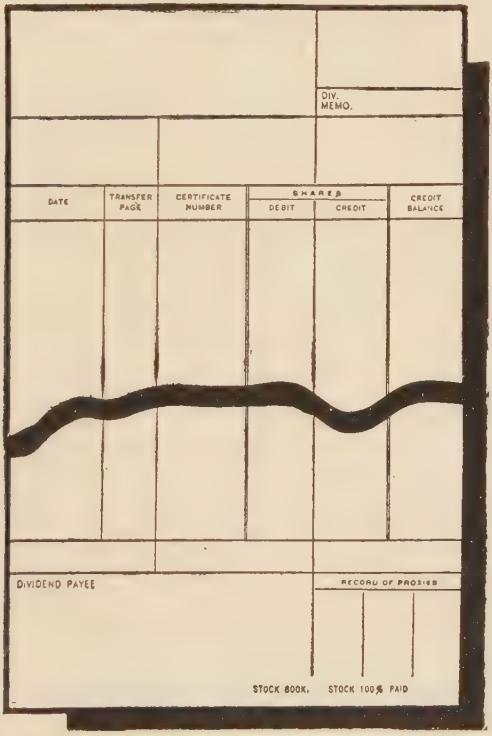


Figure 95. Ledger Card

assigned to such a task. The statistical content of the forms illustrated (Figures 95 through 103) will show the required statistics that are developed through the use of this class of equipment.

The original source of the data for the analysis is the stockholders' ledger cards as shown in Figure 95. The assistant

supervisor of the statistical section obtains these ledger cards from the supervisor of the bookkeeping section in units of trays containing approximately 1,400 accounts each. Each tray is routed first to the machine for tabulation, after which it is returned to the bookkeeping section until it is required for

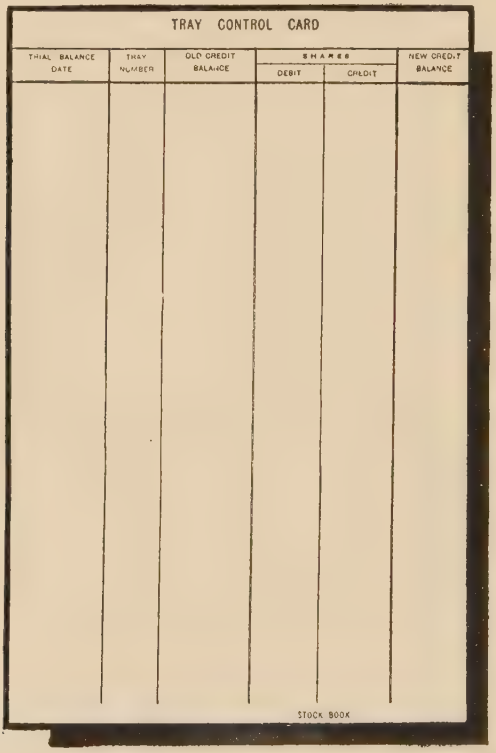


Figure 96. Tray Control Card

checking, the latter step usually taking place on the day after the tabulation. All trays are arranged in numerical sequence. This is done so that no tray will be kept out of the bookkeeping section longer than a half-day at a time. A record (Figure 96) is maintained in the bookkeeping section for trays taken out for tabulation and for trays taken out for checking. This

record shows the name of the individual to whom trays were delivered and the time they are returned. Both the tabulating machine operator and the checkers are required to observe strict care to see that ledger cards are not lost or misplaced while in their custody, and that no person except the supervisor of the bookkeeping section or the assistant supervisor of the statistical division is permitted to refer to them during machine operation.

Method of Tabulation.—The machine operator maintains a chart of tray numbers and is required to check each tray by noting the date each tray is tabulated. Cards are removed from the tray and are placed on the machine for analysis in alphabetical sequence, each card requiring the punching of one or more keys, of three control keys, and occasionally of a receipt key to produce tickets for supplementary analyses, many of which require special code numbers. The entire stock ledger is analyzed first in this manner, after which the tickets that have been produced are analyzed in the manner described below. One of the requirements of this plan is that the principal operator must remain at the machine until one o'clock each day. A relief operator must arrange for her lunch-hour before one o'clock each day, and begins machine operation for the balance of the day as soon as the principal operator stops. This arrangement permits the relief operator to perform the checking function during the morning, and the principal operator to check during the afternoon.

Description of Ledger Card.—As the operator tabulates data shown on ledger card on the tabulating machine, the first step required is to examine the cards for credit balances. After these credit balances have been determined, the amount of shares is introduced on the amount keys, and is classified in the various classifications in the manner described below. In determining geographical classifications, the operator glances first at the residence address space on the lines directly below the

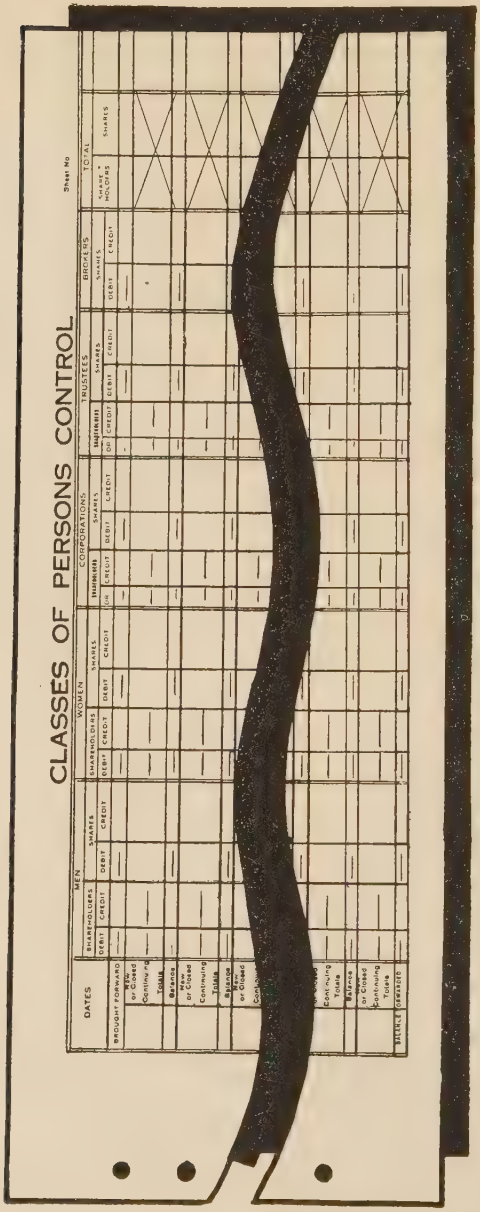


Figure 97. Classes of Persons Control Sheet

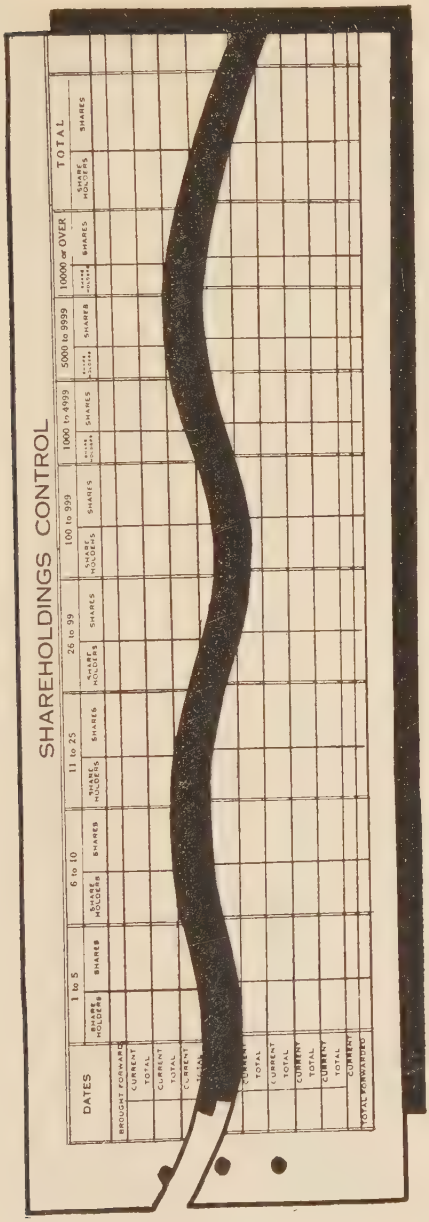


Figure 97. (Continued)

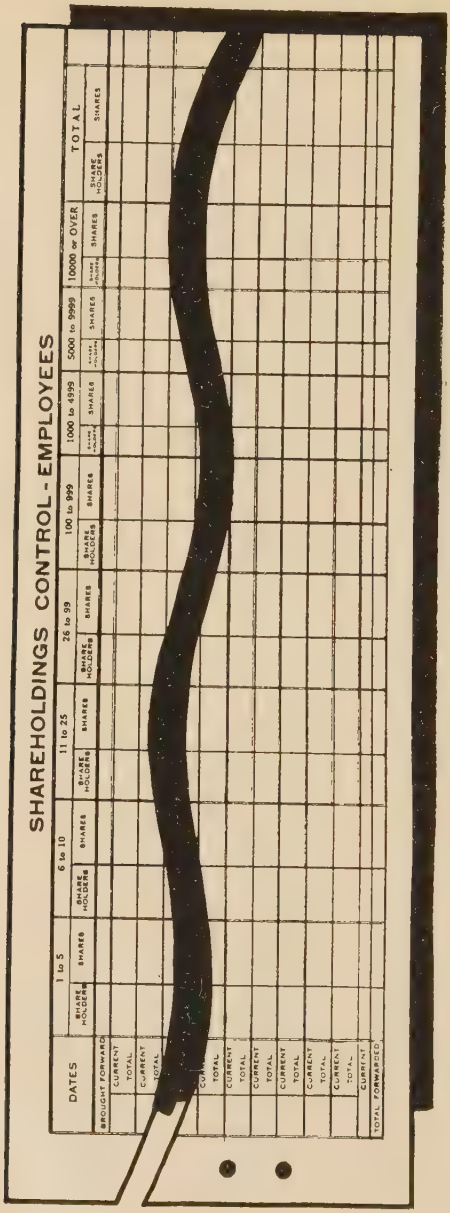


Figure 97. (Continued)

stock record portion of the ledger card. If these lines are blank, the address shown at the top of the card determines the classification.

Classes of Persons Data.—After all shares appearing upon the ledger card have been tabulated in the manner described above, the first classification is made by groups of classes of persons (Figure 97) upon the first bank of tabulation keys to the right of the amount keys. These classifications are shown upon an index plate as follows, and the machine operator is required to examine the name of the stockholder to determine which classification key should be depressed:

Key No. 27—Men
Key No. 26—Women
Key No. 25—Corporations
Key No. 20—Employees, Men
Key No. 19—Employees, Women

Employee stockholders are determined by means of the word "employee" that is stamped by a rubber stamp in green ink in the space at the upper right-hand corner of the ledger card. Whenever keys No. 20 "Employees—Men" or No. 19 "Employees—Women" are punched, keys No. 27 "Men" and No. 26 "Women" are not punched, but the "Receipt" key is pressed so as to produce a ticket for subsequent analysis in the manner described.

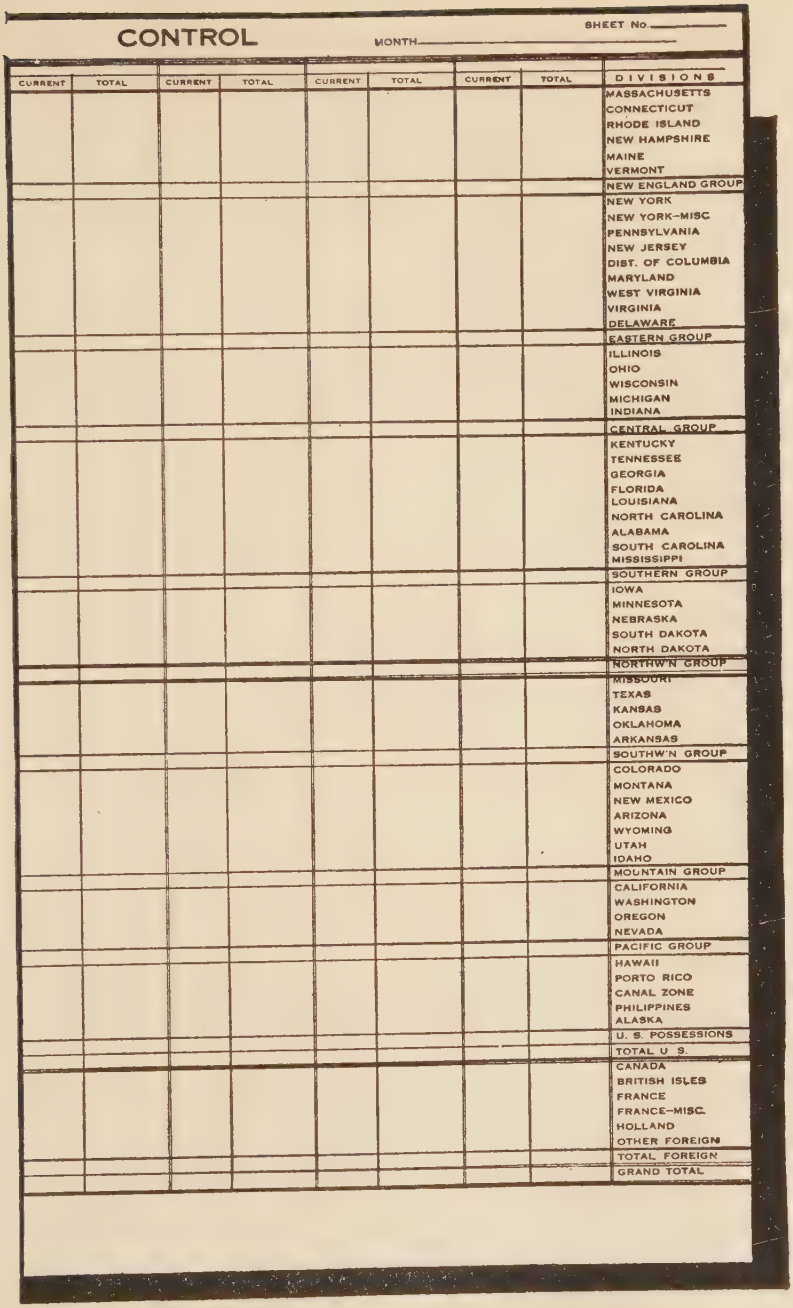
Geographical Classification.—The operator next determines the geographical classification by states or foreign countries (Figure 98). The second bank of tabulation keys used for this purpose is as follows:

Key No. 18—Massachusetts
Key No. 17—New York
Key No. 16—Pennsylvania
Key No. 15—Illinois
Key No. 14—New Jersey
Key No. 13—Connecticut

GEOGRAPHICAL

DATES / DIVISIONS	BROUGHT FORWARD						
		CURRENT	TOTAL	CURRENT	TOTAL	CURRENT	TOTAL
MASSACHUSETTS							
CONNECTICUT							
RHODE ISLAND							
NEW HAMPSHIRE							
MAINE							
VERMONT							
NEW ENGLAND GROUP							
NEW YORK							
NEW YORK–MISC							
PENNSYLVANIA							
NEW JERSEY							
DIST OF COLUMBIA							
MARYLAND							
WEST VIRGINIA							
VIRGINIA							
DELAWARE							
EASTERN GROUP							
ILLINOIS							
OHIO							
WISCONSIN							
MICHIGAN							
INDIANA							
CENTRAL GROUP							
KENTUCKY							
TENNESSEE							
GEORGIA							
FLORIDA							
LOUISIANA							
NORTH CAROLINA							
ALABAMA							
SOUTH CAROLINA							
MISSISSIPPI							
SOUTHERN GROUP							
IOWA							
MINNESOTA							
NEBRASKA							
SOUTH DAKOTA							
NORTH DAKOTA							
NORTHW'N GROUP							
MISSOURI							
TEXAS							
KANSAS							
OKLAHOMA							
ARKANSAS							
SOUTHW'N GROUP							
COLORADO							
MONTANA							
NEW MEXICO							
ARIZONA							
WYOMING							
UTAH							
IDAHO							
MOUNTAIN GROUP							
CALIFORNIA							
WASHINGTON							
OREGON							
NEVADA							
PACIFIC GROUP							
HAWAII							
PORTO RICO							
CANAL ZONE							
PHILIPPINES							
ALASKA							
U. S. POSSESSIONS							
TOTAL U. S.							
CANADA							
BRITISH ISLES							
FRANCE							
FRANCE–MISC							
HOLLAND							
OTHER FOREIGN							
TOTAL FOREIGN							
GRAND TOTAL							

Figure 98. Geographical



CONTROL

MONTH

SHEET No.

CURRENT	TOTAL	CURRENT	TOTAL	CURRENT	TOTAL	CURRENT	TOTAL	DIVISIONS
								MASSACHUSETTS
								CONNECTICUT
								RHODE ISLAND
								NEW HAMPSHIRE
								MAINE
								VERMONT
								NEW ENGLAND GROUP
								NEW YORK
								NEW YORK–MISC.
								PENNSYLVANIA
								NEW JERSEY
								DIST. OF COLUMBIA
								MARYLAND
								WEST VIRGINIA
								VIRGINIA
								DELAWARE
								EASTERN GROUP
								ILLINOIS
								OHIO
								WISCONSIN
								MICHIGAN
								INDIANA
								CENTRAL GROUP
								KENTUCKY
								TENNESSEE
								GEORGIA
								FLORIDA
								LOUISIANA
								NORTH CAROLINA
								ALABAMA
								SOUTH CAROLINA
								MISSISSIPPI
								SOUTHERN GROUP
								IOWA
								MINNESOTA
								NEBRASKA
								SOUTH DAKOTA
								NORTH DAKOTA
								NORTHW'N GROUP
								MISSOURI
								TEXAS
								KANSAS
								OKLAHOMA
								ARKANSAS
								SOUTHW'N GROUP
								COLORADO
								MONTANA
								NEW MEXICO
								ARIZONA
								WYOMING
								UTAH
								IDAHO
								MOUNTAIN GROUP
								CALIFORNIA
								WASHINGTON
								OREGON
								NEVADA
								PACIFIC GROUP
								HAWAII
								PORTO RICO
								CANAL ZONE
								PHILIPPINES
								ALASKA
								U. S. POSSESSIONS
								TOTAL U. S.
								CANADA
								BRITISH ISLES
								FRANCE
								FRANCE–MISC.
								HOLLAND
								OTHER FOREIGN
								TOTAL FOREIGN
								GRAND TOTAL

Control Sheet

Key No. 12—California
Key No. 11—New Hampshire
Key No. 10—Miscellaneous

Whenever key No. 10 "Miscellaneous" is punched, the operator is required to press the "Receipt" key at the same time. This operation produces the required ticket previously referred to for subsequent analysis. A code number key (at the right-hand side of the machine) is pressed next to indicate the state the ticket is to represent in the subsequent analysis described in paragraph headed "Ticket for Subsequent Analysis."

Shareholdings Classifications.—The operator next determines the shareholdings classification by reference to the credit balance in the account, the third bank of tabulation keys being used for this purpose as follows:

Key No. 9—	1	to	5	shares
Key No. 8—	6	to	10	"
Key No. 7—	11	to	25	"
Key No. 6—	26	to	99	"
Key No. 5—	100	to	999	"
Key No. 4—	1,000	to	4,999	"
Key No. 3—	5,000	to	9,999	"
Key No. 2—	10,000	and	over	
Key No. 1—	—	—	—	

After this tabulation key has been pressed, the operator then presses the motor bar which starts the recording mechanism of the machine to function, automatically adding the shares in the various classifications punched and producing the required ticket for subsequent analysis simultaneously.

Tickets for Subsequent Analysis.—Whenever an employee's account is being tabulated or whenever key No. 10 "Miscellaneous" is pressed for geographical classifications, the operator is required to obtain a ticket as described above. Each ticket for a miscellaneous geographical classification is identified

by a code number representing the state or foreign country of the account being analyzed. The code is printed by means of the code keys on the right side of the machine. The following codes are used for geographical classification:

1 Ala	29 Ore
2 Ariz	30 R. I.
3 Ark	31 S. C.
4 Col	32 S. D.
5 D. C.	33 Tenn
6 Del	34 Tex
7 Fla	35 Utah
8 Ia	36 Va
9 Ga	37 Vt
10 Idaho	38 Wash
11 Ind	39 Wis
12 Kans	40 West Va
13 Ky	41 Wyo
14 La	42 —
15 Md	43 Alaska
16 Me	44 Canal Zone
17 Mich	45 Hawaii
18 Minn	46 Phil Islands
19 Miss	47 Porto Rico
20 Mo	48 —
21 Mont	49 —
22 N. C.	50 —
23 N. D.	51 Brit Isles
24 Neb	52 Canada
25 Nev	53 France
26 N. M.	54 Holland
27 Ohio	55 Switzerland
28 Okla	56 Misc Foreign

Whenever it is found necessary to produce both an employee ticket and miscellaneous geographical ticket (Figure 99) for one account, a single ticket serves this purpose, as it bears the required code numbers as a "double" ticket with a special code number. This special code number is provided by punching key No. 9 in the extreme right-hand bank of the machine,

known as "No. 9—Special." As tickets are produced, the employee tickets are separated immediately from the miscellaneous geographical tickets. All tickets bearing code letter "No. 9—Special" are retained with the employee tickets.

Obtaining Totals.—When all the cards of a tray have been classified the operator proceeds to clear the machine by taking the totals of each tabulation key, the operator then removes the audit sheet (or tape) from the machine, posting the tray number and the amounts shown on the item counters, for each tabulation key thereon. The audit sheet (or tape) and the two groups of tickets are then dispatched to checkers. The tray of

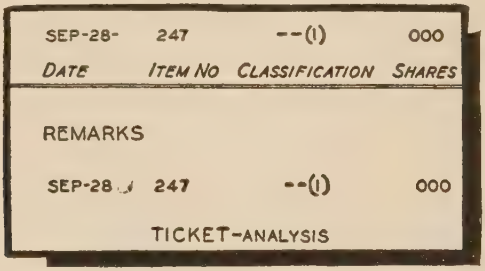


Figure 99. Tabulating Machine Ticket

stockholders' ledger cards is delivered to the assistant supervisor of the statistical section who is charged with the responsibility of returning trays upon complete analysis to the bookkeeping section. The machine operator then restores all item counters to zero and proceeds to work on a new tray for analysis.

Checking and Balancing.—The assistant supervisor maintains a chart showing the trays which have been checked and which are to be checked, and is required to arrange and dispatch trays for analysis as near in numerical sequence as is possible. Each clerk assigned to checking is given an audit sheet (or tape) and other data described above, obtaining from the supervisor of the bookkeeping section the tray of stock-

DAILY RECAPITULATION SHEET

DATE

GEOGRAPHICAL

	SHARES								SHAREHOLDERS			
	STATES	NEW ACCOUNTS	CONT'G CR.	CLOSED-OUT ACCOUNTS	CONT'G DR.	TOTAL CR.	TOTAL DR.	NET TOTAL CR.	NET TOTAL DR.	CR.	DR.	NET TOTAL	STATES
	MASS.												MASS.
	N Y												N. Y.
	PA.												PA.
	ILL.												ILL.
	N. J.												N. J.
	CONN.												CONN.
	CAL.												CAL.
	N. H.												N. H.
	ME.												ME.
	R. I												R. I
	OHIO												OHIO
	WISC.												WISC.
	MD												MD.
	D. C.												D. C.
	MO												MO.
	VT												VT
	MICH												MICH
	MISC.												MISC.

CLASSES OF PERSONS

	SHARES								SHAREHOLDERS			
		NEW ACCOUNTS	CONT'G CR.	CLOSED-OUT ACCOUNTS	CONT'G DR	TOTAL CR	TOTAL DR	NET TOTAL CR	NET TOTAL DR.	CR.	DR	NET TOTAL	
	MEN												MEN
	WOMEN												WOMEN
	CORP												CORP
	TRUSTEES												TRUSTEES
	BROKERS												BROKERS

SHAREHOLDINGS

SHARES

	OLD BALANCE				NEW BALANCE				NET TOTAL		
	CONT'G CR	CLOSED-OUT ACCOUNTS	CONT'G DR.	TOTALS	NEW ACCOUNTS	CONT'G CR.	CONT'G DR.	TOTALS	CR.	DR.	
1-5											1-5
6-10											6-10
11-25											11-25
26-99											26-99
100-999											100-999
1000-4999											1000-4999
5000-9999											5000-9999
10,000&OVER											10,000&OVER
TOTALS											

SHAREHOLDERS

	OLD BALANCE				NEW BALANCE				NET TOTAL		
	CONT'G CR.	CLOSED-OUT ACCOUNTS	CONT'G DR.	TOTALS	NEW ACCOUNTS	CONT'G CR.	CONT'G DR.	TOTALS	CR.	DR.	
1-5											1-5
6-10											6-10
11-25											11-25
26-99											26-99
100-999											100-999
1000-4999											1000-4999
5000-9999											5000-9999
10,000&OVER											10,000&OVER
TOTALS											

Figure 100. Daily Recapitulation Sheet

holders' ledger cards to which the analysis applies. Each card is then compared with the corresponding item on the audit sheet (or tape) and the code numbers representing the various classifications as follows are checked:

1. Classes of persons.
2. Geographical classification.
3. Shareholdings.

The checker compares credit balance of the account, number of shares shown upon the audit sheet (or tape) and in instances where an employee's account or a miscellaneous geographical classification is encountered, the checker must determine whether the necessary tickets have been properly produced. If errors are discovered the checker is required to make all necessary corrections upon the audit sheet (or tape) with a full explanation of each correction.

So soon as a tray has been checked, the totals for each classification are adjusted for the corrections which have been made, and the results are balanced as follows:

1. The total number of shares for each group of classifications should be in agreement with the total number of shares in the credit balance on the tray control card.

2. The total number of items shown by the item counters for each group should be in agreement with each other, and also with the total number of items run, as shown upon the audit sheet (or tape).

Analysis of Employees' Tickets.—As soon as the operator has completed the analysis of the ledger cards, the groups of tickets which have been produced for the subsequent analysis previously referred to for employee statistics are then analyzed by ledger trays in numerical sequence in the following manner: the shares upon each ticket are punched upon the amount keys; the tabulation key code numbers appearing in parenthesis before the shares on the ticket are then punched on the tabulation key

bearing that number, except that code numbers 19 to 27 inclusive are ignored.

In instances where a ticket representing a miscellaneous geographical item and bearing the code "No. 9—Special" immediately to the right of the serial number of the ticket is encountered, key No. 10 "Miscellaneous" will be punched, and the ticket is set aside to be rerun later for further analyses of miscellaneous geographical items. All miscellaneous geographical code numbers are ignored on these tickets at this run.

After the tickets for each tray have been tabulated, the operator proceeds to clear the machine by taking totals and extracting the audit sheet (or tape) entering the tray number and figures appearing on the item counters thereon. After this has been done, the operator dispatches the audit sheet (or tape), together with the finished tickets, to the checkers.

Miscellaneous Geographical Tickets.—After the analysis of all employee tickets has been completed as described above, the operator proceeds to run the miscellaneous geographical group of tickets, including those bearing the code "No. 9—Special" which have been set aside from the run of employee tickets. The tickets representing the employee accounts are first run in the manner described below, procuring sub-totals and totals indicated by item counters upon completion of each run, and before the remaining tickets are tabulated. The analysis performed is as follows:

1. The number of shares are punched upon the amount keys. The geographical code keys appearing upon the tickets to the left of the amount (and not in parenthesis) are then punched upon the tabulation key bearing that number, codes from 1 to 27 inclusive being tabulated.

2. In instances where a ticket is encountered which bears a geographical code number of 28 or above, it is set aside for subsequent analysis. Employee tickets in these classifications are kept separate from the remainder.

DAILY RECAPITULATION SHEET—EMPLOYEES

DATE

GEOGRAPHICAL

	STATES	SHARES: NEW ACCOUNTS	SHARES: CONT'G CR.	SHARES: CLOSED-OUT ACCOUNTS	SHARES: CONT'G DR.	SHARES: TOTAL CR.	SHARES: TOTAL DR.	SHARES: NET TOTAL CR.	SHARES: NET TOTAL DR.	SHAREHOLDERS: CR	SHAREHOLDERS: DR	SHAREHOLDERS: NET TOTAL	STATES
	MASS.												MASS.
	N. Y.												N. Y.
	PA.												PA.
	ILL.												ILL.
	N. J.												N. J.
	CONN.												CONN.
	CAL.												CAL.
	N. H.												N. H.
	ME.												ME.
	R. I.												R. I.
	OHIO												OHIO
	WISC.												WISC.
	MD.												MD.
	D. C.												D. C.
	MO.												MO.
	VT.												VT.
	MICH												MICH.
	MISC.												MISC.

CLASSES OF PERSONS

		SHARES: NEW ACCOUNTS	SHARES: CONT'G CR	SHARES: CLOSED-OUT ACCOUNTS	SHARES: CONT'G DR.	SHARES: TOTAL CR.	SHARES: TOTAL DR.	SHARES: NET TOTAL CR.	SHARES: NET TOTAL DR.	SHAREHOLDERS: CR.	SHAREHOLDERS: DR.	SHAREHOLDERS: NET TOTAL	
	MEN												MEN
	WOMEN												WOMEN

SHAREHOLDINGS

SHARES

		OLD BALANCE: CONT'G CR	OLD BALANCE: CLOSED-OUT ACCOUNTS	OLD BALANCE: CONT'G DR	OLD BALANCE: TOTALS	NEW BALANCE: NEW ACCOUNTS	NEW BALANCE: CONT'G CR.	NEW BALANCE: CONT'G DR.	NEW BALANCE: TOTALS	NET TOTAL: CR.	NET TOTAL: DR.	
	1-5											1-5
	6-10											6-10
	11-25											11-25
	26-99											26-99
	100-999											100-999
	1,000 & OVER											1,000 & OVER
	TOTALS											

SHAREHOLDERS

		OLD BALANCE: CONT'G CR.	OLD BALANCE: CLOSED-OUT ACCOUNTS	OLD BALANCE: CONT'G DR.	OLD BALANCE: TOTALS	NEW BALANCE: NEW ACCOUNTS	NEW BALANCE: CONT'G CR.	NEW BALANCE: CONT'G DR.	NEW BALANCE: TOTALS	NET TOTAL: CR.	NET TOTAL: DR.	
	1-5											1-5
	6-10											6-10
	11-25											11-25
	26-99											26-99
	100-999											100-999
	1,000 & OVER											1,000 & OVER
	TOTALS											

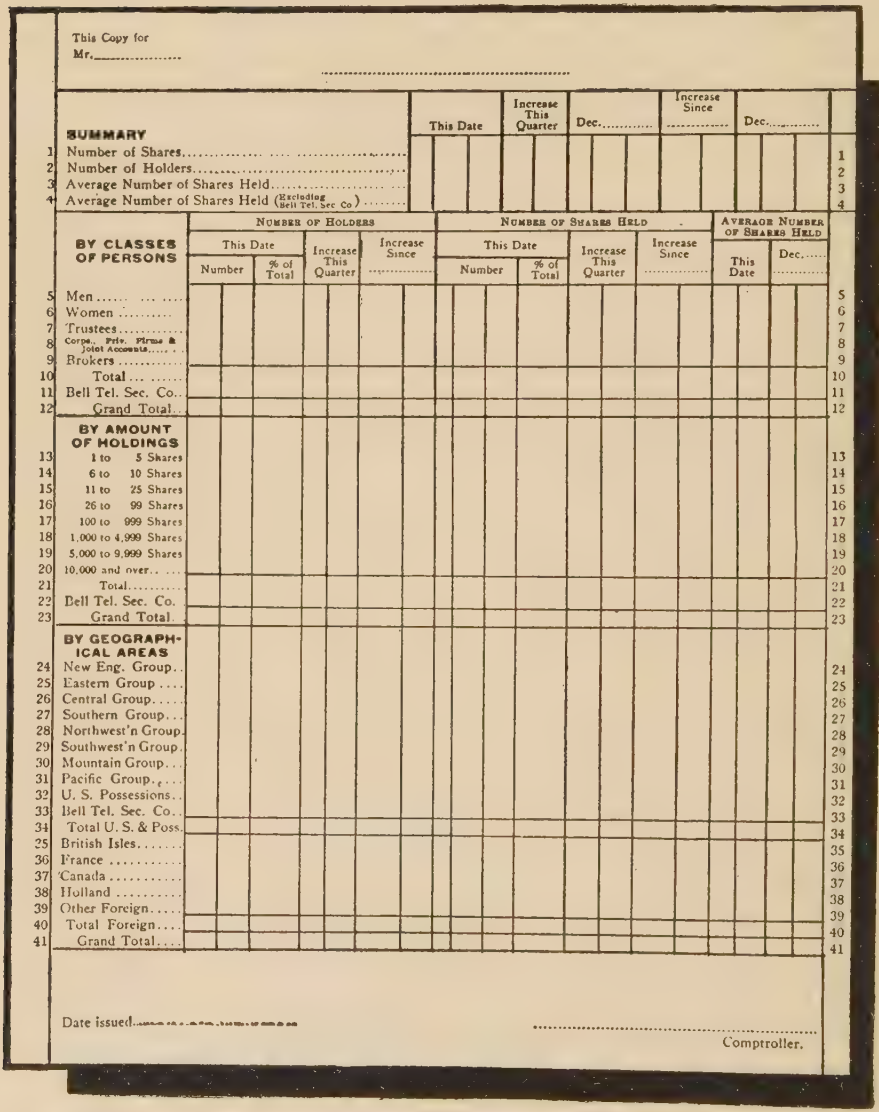
Figure 101. Daily Recapitulation Sheet (Employees)

MISCELLANEOUS GEOGRAPHICAL RECAPITULATION

DATE_____

	SHARES														SHAREHOLDERS						
	EMPLOYEES							TOTAL							EMPLOYEES			TOTAL			
STATES	NEW ACCTS	CONT'G CR.	CLOSED OUT ACCTS	CONT'G DR.	TOTAL CR.	TOTAL DR.	NET TOTAL	NEW ACCTS	CONT'G CR.	CLOSED OUT ACCTS	CONT'G DR.	TOTAL CR.	TOTAL DR.	NET TOTAL	CR.	DR.	NET TOTAL	CR.	DR.	NET TOTAL	STATES
W. VA.																					W. VA.
VA.																					VA.
DEL.																					DEL.
IND.																					IND.
KY.																					KY
TENN.																					TENN.
GA.																					GA.
FLA.																					FLA.
LA.																					LA.
N. C.																					N. C.
ALA.																					ALA.
S. C.																					S. C.
MISS.																					MISS.
IOWA																					IOWA
MINN.																					MINN.
NEB.																					NEB.
S. D.																					S. D.
N. D.																					N. D.
TEXAS																					TEXAS
KANS.																					KANS.
OKLA.																					OKLA.
ARK.																					ARK.
COLO.																					COLO.
MONT.																					MONT
N. M.																					N. M.
ARIZ.																					ARIZ.
WYO.																					WYO.
UTAH																					UTAH
IDAHO																					IDAHO
WASH.																					WASH.
OREGON																					OREGON
NEV.																					NEV.
S.T.&CO.																					S.T.&CO.
TOTALS																					TOTALS

Figure 102. Miscellaneous Geographical Recapitulation Sheet



This Copy for
Mr._____

SUMMARY

		This Date	Increase This Quarter	Dec.	Increase Since	Dec.	
1	Number of Shares						1
2	Number of Holders						2
3	Average Number of Shares Held						3
4	Average Number of Shares Held (Excluding Bell Tel. Sec. Co.)						4

	BY CLASSES OF PERSONS	Number of Holders: This Date Number	This Date % of Total	Increase This Quarter	Increase Since	Number of Shares Held: This Date Number	This Date % of Total	Increase This Quarter	Increase Since	Average Number of Shares Held: This Date	Dec.	
5	Men											5
6	Women											6
7	Trustees											7
8	Corps., Priv. Firms & Joint Accounts											8
9	Brokers											9
10	Total											10
11	Bell Tel. Sec. Co.											11
12	Grand Total											12
	BY AMOUNT OF HOLDINGS											
13	1 to 5 Shares											13
14	6 to 10 Shares											14
15	11 to 25 Shares											15
16	26 to 99 Shares											16
17	100 to 999 Shares											17
18	1,000 to 4,999 Shares											18
19	5,000 to 9,999 Shares											19
20	10,000 and over											20
21	Total											21
22	Bell Tel. Sec. Co.											22
23	Grand Total											23
	BY GEOGRAPHICAL AREAS											
24	New Eng. Group											24
25	Eastern Group											25
26	Central Group											26
27	Southern Group											27
28	Northwest'n Group											28
29	Southwest'n Group											29
30	Mountain Group											30
31	Pacific Group											31
32	U. S. Possessions											32
33	Bell Tel. Sec. Co.											33
34	Total U. S. & Poss.											34
35	British Isles											35
36	France											36
37	Canada											37
38	Holland											38
39	Other Foreign											39
40	Total Foreign											40
41	Grand Total											41

Date issued_____

_____
Comptroller.

Figure 103. Summary

3. Care is observed that tickets which bear the code "No. 9—Special," indicating an employee ticket, are not mistaken for tickets bearing the geographical code "No. 9."

4. After the tickets for each tray have been tabulated, the operator proceeds to clear the machine by taking totals, extracting the audit sheet (or tape), entering the tray number and the figures appearing upon the item counters thereon, and dispatching the audit sheet (or tape) together with the finished tickets, to the checkers.

Checking and Balancing.—Checkers are required to check and balance the audit sheets (or tapes) which represent the analysis of employee statistics by trays as they are received from the machine operator, returning the miscellaneous geographical employee tickets to the operator as required and later checking the analysis of miscellaneous geographical tickets in the same manner and as shown in Figure 100. As each tray is audited and balanced, the resulting totals are posted to the control accounts as described below.

Miscellaneous geographical items which represent classifications bearing code numbers of 28 and above are sorted by the checkers, totaled by groups, and posted direct to control accounts in the following manner:

1. Classes of Persons Classifications.—The classes of persons control (Figure 101) used for this purpose, lines being numbered from 1 to 192 inclusive, represent ledger trays. Two sets of these reports are prepared, one representing employee accounts, and the other representing total accounts. Entries for shares and shareholders are made on each line in the appropriate columns.

2. Shareholders Classifications.—The shareholdings control (Figure 102) is used in exactly the same manner as described above for the classes of persons control.

3. Geographical Classifications.—A special control report (Figure 103) for geographical classifications is provided for both employee accounts and total accounts, which are used to record

the total shares and shareholders of each geographical classification for each tray.

A progress report is maintained by the assistant supervisor of the statistical section, which exhibits the number of trays and the number of stockholders' accounts that have been tabulated, balanced, and posted to the control accounts each day.

CHAPTER XVII

WAGE AND BONUS PLANS FOR MACHINE OPERATORS

The Importance of Suitable Wage and Incentive Systems. —The subject thus far has conducted us to what appears a satisfactory solution of the principle of machine application to accounting and statistical conditions. The consideration of the installation of mechanical methods, however, does not end with the direct rules for its performance. Something must be said of the various methods of wage payment, bonuses, and problems that arise in connection with mechanical accounting installations. The question of wages and the method of arriving at a satisfactory standard has caused more difficulty than any other element in mechanical accounting installations. The reason for this is that we are now dealing with accounting machine operators instead of with the equipment or methods, which introduces a factor over which the management in some cases can never exercise complete control.

It has been demonstrated in many cases that delays and interferences in operative accounting routines are avoidable through proper planning, and that leaving such things to chance when they may be made a positive certainty is wrong. Operators may complain with a great deal of justification when they are forced to make extra effort under such conditions. There is never a complaint, and there never has been, to the knowledge of the authors, where the operator is given an opportunity to do the best he or she can with most obstacles removed.

The successful operation of a mechanical operative accounting routine depends not alone on the particular type of equip-

ment used, but upon the human element involved as well. Quality and quantity production should be given consideration if the work of a routine is to function efficiently, and this can be accomplished only by offering some definite incentive to the workers, which may be either in increased pay or shorter hours.

Factors Involved in Establishing Wage and Incentive Plan.—The general subject of wage payment may be divided into two main sections: first, the determination of an equitable basic weekly salary; and second, the determination of an equitable system for rewarding a machine operator or clerk in proportion to the amount and quality of work performed. The first involves a study of living conditions of the locality within which the business is operating, and the existing market demand of competent office help, and allied subjects. The second is concerned principally with a study of the various wage incentive plans applicable, and an understanding of the basic considerations involved in the development and application of those plans.

There has been too much confusion prevalent concerning clerical wage incentives for those working in mechanical operative accounting routines where mass production exists, due primarily to the adoption and similarity of the various plans especially developed for factory use, and to the lack of a true basis of comparison of them, one with another. For this reason an attempt will be made here to clear up the subject of wage incentives which have been and still are so haphazardly introduced to workers in operative accounting routines. No attempt will be made to discuss the basic weekly rate; consideration will be confined principally to wage incentive plans.

Theoretically, machine operators employed under the weekly rate basis are usually paid according to their worth to their employers, those doing the largest quantity of work or the most difficult routine work receiving the highest rate of pay. Prac-

tically, such a system does not produce the desired results in operative accounting routine work, and consequently several methods of wage payment have been developed to meet the need for a real incentive to the clerical routine worker and accounting machine operator to produce a reasonable maximum amount of work.

The changes brought about through the adoption of mechanical accounting methods have also brought about changes in the relations existing between the management and the clerical force involved, among which may be cited the following:

1. Estrangement of employer and employee.
2. Elimination of the personal element in routine management.
3. Simplification of routine operations through machine installation often misunderstood.

Such changes have often quite naturally brought about a different attitude of an employee toward his work and toward the accounting executives in charge, among which are the following:

1. Lack of real interest in work.
2. Lack of ambition.
3. Lack of real interest in the success of the routine to which the individual is assigned.
4. Principal objective to obtain a maximum of pay for a minimum amount of work.

It should be remembered that an incentive system to be effective must be established in accordance with certain fundamental requirements. When an incentive system is designed so that the employee's regular weekly rate plus incentive earnings only equals the community wage level rate for that particular class of clerical worker, it is a very grave mistake. The basic rate should be on a par with the community wage level, and the incentive earned by the worker should be arranged so as to raise the total earnings above the community wage level

rate, thereby enabling the employee to receive an equitable compensation as a definite reward for increased efforts.

Quite often a clerk or machine operator is found who exerts his or her best efforts all of the time, even though working on a straight weekly salary basis. Such cases are few and far between, and it may be stated that if an incentive system is properly established, it will not only increase the wages of such a worker but decrease the clerical cost of the routine involved. If this is not accomplished, the operative methods of the routine should be scrutinized carefully to discover wherein it lacks in performance and speed in operation.

Any system of operative accounting which is not understood by the clerical staff is doomed to failure. Standards of performance set by guess are not real standards and consequently cannot be fair to all concerned. Clerical workers of average intelligence have a natural aptitude to detect unfair methods, and they are entirely justified in refusing to cooperate to their best ability if the executive in charge, or the management, employs careless routine methods of operative accounting in connection with the very important subject of determining the amount of money to be paid them at the end of a pay period.

The industrial history of the factory piece rate system has demonstrated how futile it is to attempt to beat the workers at their own game. The same condition prevails in general office work and operative accounting routine methods wherein large quantities of media are handled. It must be remembered that nothing is more fatal to the successful operation of an incentive system than to have it so complicated, so difficult to apply, that an excessive amount of effort is required to make it function properly.

Factors Beyond Control of Machine Operators.—After once deciding that some form of incentive system is desirable and should be adopted, other questions naturally arise which

may be regarded as attributes of certain incentive systems. They are, in fact, basic considerations entirely apart from any specific system and should not be confused with them. It is not fair to penalize clerical workers or machine operators for the result of conditions entirely beyond their control. If the work is intermittent and delays are due to lack of media flow, inefficient machine preparation, and ineffective accounting control, such conditions result in a large amount of lost time and wasted effort. They are often entirely beyond the control of the worker, and to penalize for them is unfair. Where such conditions exist, a minimum day rate should be guaranteed until the difficulties have been entirely remedied. Where such conditions do not exist and the worker has absolute control over the quality and quantity of his machine production, then it might prove feasible to pay for the work correctly and adequately performed.

A large portion of the value of setting incentives is obtained by first improving the inefficient methods of the routine and working conditions involved which a survey would reveal, but which it is impossible to detect in any other way; and after the routine and working conditions have been standardized and rates have been established, there is the additional advantage of knowing that such rates are fair to both the employee and management.

Surveys for Rate Setting and Wage Incentive Purposes. —The authors do not hesitate, therefore, to recommend exhaustive surveys under one condition: that such surveys should be made by an experienced and practical individual. It must also be remembered that it is far better and more advantageous not to make such a survey than to put a novice at such a task and expect satisfactory results, because of the fact that survey studies of mechanical accounting routine methods for rate-setting purposes are divided into five different, distinct, and very important activities:

1. A detailed study of the routine, equipment, accounting control, and the functions of machine operators and other clerks.
2. An analysis of the work, dividing it into its elemental operations by flow of media, sorting of media, control of media, machine operation, and proof of work.
3. The making of detailed studies of time required in the performance of elemental operations and recording the associated data.
4. The analysis of data collected and making of recommendations.
5. The determination of standards of performance.

Standards Established Through Time Studies.—Time standards of mechanical accounting routine methods may be divided under three headings as follows:

1. Time required in:
   (a) Flow of media.
   (b) Preparing media for machine operation.
   (c) Accounting control before machine operation.
   (d) The machine operation.
   (e) Accounting control after machine operation.
   (f) Proof.
2. Time spent in the performance of actual sorting of media and machine operation.
3. Time taken out for rest periods and for personal conveniences of the machine operator.

Factors Involved in Setting Wage Incentives.—Beyond the foregoing general approach to the subject of setting incentives the following special phases of the problem should be carefully considered:

1. Determining the operation unit.
2. Determining the standard production for each unit.
3. Establishing a graded list of errors.
4. Establishing adequate incentives for increased production.

5. Setting penalties for inefficiency and errors.
6. Securing and maintaining records of time, production, and cost of operations.

These factors have their setting in the general plan of wage and incentive determination, and they may be further classified as follows:

1. Personnel:
   (a) Number of workers.
   (b) Method of payment.
   (c) Earnings, separately and in total.
   (d) Length of service of each.
   (e) Date of last increase of salary of each.
   (f) General impression.
2. Work:
   (a) Analysis of character of work.
   (b) What is performed by each individual.
   (c) What is true cost in detail.
   (d) Status of present production.
   (e) Setting standards of production.
3. Purpose:
   (a) Obtain data on growth of each activity.
   (b) Compare relative utility of the various activities.
   (c) Provide basis for salary adjustments.
4. Future plans:
   (a) Discontinuance of operation.
   (b) Combination with another operation to promote efficiency or reduce cost.
   (c) Institution of a system of control.

The Value of Job Analysis.—A thorough application of job analysis, therefore, becomes essential to obtain a satisfactory unit of operation. For an analysis to be effective it may involve long and complicated series of time studies, but more often a simple common-sense division of the operation of the routine into its component parts will suffice, if accom-

panied with a positive consideration of the relation of the parts to the time required to perform them.

How Prominent Wage Systems Are Applied to Accounting Machine Operators.—With the foregoing remarks in mind, an explanation and analysis of the more prominent wage systems is presented, and their relative advantages discussed.

The conditions of the problem illustrated are based on the following:

MECHANICAL ACCOUNTING ROUTINE APPLICATION: CONSUMERS' GAS BILLING

Basic Rate of Machine Operator per hour	$.50
Basic Rate per week	$22.00
Working hours per week	44
Number of bills required to be written per hour	250
Number of bills actually written per hour throughout week	300

The wage and incentive systems considered in this analysis are:

1. Straight Day Rate.
2. Straight Piece Rate.
3. 100% Time Premium.
4. 50% Halsey Premium.
5. Emerson Bonus.
6. Gantt Task with Bonus.
7. Taylor Differential Piece Rate.

An explanation and example of each of the above seven well-known wage plans, with a discussion of their advantages and disadvantages follows:

1. STRAIGHT DAY RATE. Often referred to as straight hourly rate. A specified rate per hour is established for each machine operator regardless of the amount of work that is accomplished.

Example.

Hourly rate: $.50.

Amount earned in 7 hours equals:

$$7 \text{ hours} \times \$.50 = \$3.50$$

2. Straight Piece Rate. A specified rate per bill is established for each bill machined by operators, regardless of the amount of time consumed in doing the work.

Example.

Piece rate: $.0022 per bill

Amount earned for producing 2,100 bills per day at the rate of 300 bills per hour equals:

$$2{,}100 \times \$.0022 = \$4.62$$

3. 100% Time Premium Plan.

(a) A task time is established for the production of a certain number of bills.

(b) A specified rate per hour is established for eacn operator.

(c) The machine operator receiving one hour's pay at the established rate for each task hour's work which is performed.

Example.

Task time: 1 hour for writing 250 bills, or 1,750 bills per day

Hourly rate: $.50

Amount earned for writing 2,100 bills during a 7-hour day equals:

$$\frac{2{,}100}{1{,}750} = 120\% \times \$3.50 = \$4.20$$

4. 50% Halsey Premium Plan.

(a) A task time is established for the production of a certain number of bills per hour.

(b) A specified rate per hour is established for the machine operator.

(c) The machine operator receives specified hourly rate for each hour worked plus a premium equal to 50% of the value (at machine operator's rate) of time saved in the billing operation.

Example.

Task time: 1 hour for writing 250 bills, or 1,750 bills per 7-hour day

Hourly rate: $.50

Amount earned for writing 2,100 bills during 7-hour day equals:

$$(7 \times \$.50) + \left(\frac{2{,}100 - 1{,}750}{250}\right) \times \$.50 \times \tfrac{1}{2} = \$3.85$$

5. Emerson Bonus System.

(a) A task time is established for the production of a certain number of bills per hour.

(b) A specified rate per hour is established for the machine operator.

(c) A bonus table showing the amount of bonus to be paid for varying degrees of efficiency as established by Harrington Emerson.

Simplified Emerson Bonus Table

Efficiency Percentage	Bonus per $1 Wages
95	.1453
96	.1557
97	.1662
98	.1770
99	.1881
100	.20
101	.21
102	.22
103	.23
105	.25
110	.30
120	.40
130	.50

(d) The machine operator receives a specified hourly rate for each hour worked plus a percentage of such rate as determined by the efficiency in the performance of the work.

Example.

Task time: 1 hour for writing 300 bills, or 2,100 bills per 7-hour day

Hourly rate: $.50

Amount earned for writing 1,750 bills during 7-hour day: $3.50

Task hours' work performed: 8⅓ hours

Actual time taken: 7 hours

Efficiency:

$$\frac{2{,}100}{1{,}750} = 120\%$$

Bonus per cent: 40% (from table)
Earnings:

$$(7 \times \$.50) + 40\% = \$4.90$$

6. Gantt Task with Bonus System.

(a) A task time is established for the production of a certain number of written bills per hour.

(b) A specified rate per hour is established for the machine operator.

(c) The machine operator performing the task within the time allowed is paid for time allowed plus a percentage of that time.

Example.

Task time: 1 hour for writing 250 bills, or 1,750 bills per day
Hourly rate: $.50
Incentive allowance: 33 1/3%
Amount earned for writing 2,100 bills during 7-hour day equals:
Task time for 2,100 bills equals:

$$\frac{2{,}100}{1{,}750} = 8\ 33/100 \text{ hours}$$

As the time taken was less than the task time, the machine operator earned:

$$(8\ 33/100 \text{ hours} \times \$.50) + (33.33\% \times 8\ 33/100 \text{ hours} \times \$.50)$$
$$= \$4.17 + \$1.39 = \$5.56$$

7. Taylor Differential Piece Rate.

(a) A task time is established for the production of a certain number of written bills per hour.

(b) A high piece rate is established which is paid the machine operator who completes a task in the time allowed.

(c) A low piece rate (5/6 of the normal rate) is established, which is paid to the machine operator if failing to complete the task in the time allowed.

Example.

Task time: 1 hour for writing 250 bills, or 1,750 bills in a 7-hour day
High piece rate: $.00275 per bill

Low piece rate: $.00167 per bill

Amount earned for writing 2,100 bills during 7-hour day is calculated as follows:

Task time for 2,100 bills equals 8 33/100 hours

As the task was performed in less than task time, the amount earned is:

$$2{,}100 \times \$.00275 = \$5.78$$

Systems Employed by Public Utility Companies.—In fixing standards of production in the consumers' accounts division for electric consumption billing and posting operations where mechanical accounting equipment is used, the following methods were adopted after much study and deliberation. The hourly standards of attainment for work that were established were as follows:

	Units
Billings on scattered accounts through books	25
Miscellaneous billings such as meter rereads scattered through the books	50
Regular billings from meter books	135
Writing up index cards for new customers	30
Posting cash payments on electric bills	110
Posting cash payments on merchandise	65
Posting final charges on electric bills, a slow operation entailing the closing of scattered accounts	19
Miscellaneous debiting such as rereads	40
Regular debiting on electric bills	140

Under the methods adopted, each employee submits to his division head a daily work report enumerating the various duties to which assigned and time spent, and the number of units of each class of work performed. Any possible tendency of the employee, either accidental or intentional, to claim too much is disclosed by a monthly check of the total volume of any given operation performed—credit postings, for instance—against the sum of the figures on the individual reports.

The figures on each worker's daily report are compiled in the form of a daily speed record. On the daily speed records

appear the names of all employees engaged in one kind of work, each employee's name being followed by his day's volume, daily average for the month to date, and daily average for the preceding month. These records are summarized on a monthly speed record that indicates the number of units of each kind of work each employee performed during the month, the number of hours spent in each kind of work, and the average number of units performed per hour. To determine the efficiency of any employee at his allotted task, the division chief has only to check the hourly average against the standard of performance for that task.

Monthly reports of the entire division are summarized on an annual report that discloses, month by month, the hourly rates maintained in the various classes of work: regular and miscellaneous debit postings, and average; regular, miscellaneous, and final billings, and average; and credit postings. From the monthly speed report the division chief prepares a monthly efficiency report listing the employees' names, their percentage of efficiency at each of the operations in which they have been engaged based on the ratio between their actual performance and the standard established, and their percentage of average efficiency. This average, it might be stated, is obtained by "weighting" to allow for the time spent at each operation. Thus, if a worker is 120% efficient at one operation, and 95% at another, it might appear that his average efficiency was 107½%, or half the sum of 120 and 95. If, however, he worked one week at the operation on which he was 120% efficient, and three weeks at the operation on which he was 95% efficient; then he was 120% efficient only 25% of the time and 95% efficient 75% of the time. Multiplying 120 by .25, and 95 by .75, and adding the sum of their products, establishes an average efficiency percentage of 101¼.

Under the premium system adopted, each operator, through his efficiency record, becomes the arbiter of his own salary, because he is graded according to his efficiency, and salary auto-

matically increases with the grade. The grades and monthly salaries follow:

Below 80%	$ 75.00 per month
80 to 89%	80.00 per month
90 to 99%	85.00 per month
100 to 109%	90.00 per month
112 to over	100.00 per month

Under such a plan salary raises are contingent, not upon the length of services, but upon quantity and quality production. Nor is any employee obliged to grope in the dark and figure out for himself the best way to perform the allotted task; standard practice instructions take care of this phase of the problem. In the course of time employees acquire the habit of ignoring certain instructions or modifying them to suit their own ideas. Such a condition may be overcome by checking periodically the functions performed by each with standard practice instructions, and by so doing, the system will remain a system unaffected by changes in personnel and time.

Another excellent wage schedule is submitted below, the results of which have a tendency to eliminate lost time, increasing production with increased efficiency and accuracy. The grades and weekly salaries follow:

Points per Month	Wages per Week
6,500	$20.00
7,000	21.00
7,500	22,00
8,000	23.00
8,500	24.00
9,000	25.00
9,500	26.00
10,000	27.00
10,500	28.00
11,000	29.00
11,500	30.00
12,000	31.00

12,500	$32.00
13,000	33.00
13,500	34.00
14,000	35.00

All work is performed on descriptive writing accounting machines, and is rated as follows:

Residence billing and all overdue statements one point for each bill and statement.

Commercial and disconnect billing: two points for each bill, as this class of work is very much slower than residence billing.

Weekly, special, municipal, sign, and deferred billing, also typing of merchandise and regular overdue statements are counted as three points for each bill or statement. It usually takes three times as long to bill this special work as residence billing.

Typing of weekly, energy, special and municipal overdue statements are to be counted as five points each, due to a great share of statements having many balances to be typed on: five points each.

When the 400 or 900 mark in any group is passed, the next even figure of 500 or 1,000 step of the rate scale is allowed. Adding the points made on special work to total points made on regular work will increase the production per machine, as it will have a direct bearing on the operator's wage.

The number of errors are taken into account, and are deducted from operating total points, according to the following schedule:

No. 1—Class of Error. Failure to clear machine, billing on wrong bill, or placing wrong caption on ledger records, duplicate billing, and incorrect subtractions—deduct one hundred points for each error.

No. 2—Class of Error. Incorrect totals on bottom of balance sheet—deduct 50 points for each error.

No. 3—Class of Error.—Writing over figures and failure to

type in headings on bills or ledger records when blanks are used—deduct ten points for each error.

No. 4—Class of Error. Errors in spacing, running bills together on control sheets, clerical errors of extensions, errors on statements, failure to leave proper spacing to facilitate count of consumers—deduct five points for each error.

A decided departure from the two previous systems is illustrated in the following wage and bonus system which was adopted by an eastern gas utility company, after proper deliberation and consideration were given to the operative accounting routine of consumers' gas billings and ledger posting. This accounting routine was so scheduled that 80,000 consumers in particular parts of the city within which the company operates, were billed on certain specific days during the month. Dividing the city into zones or districts made possible the arrangement of a schedule for meter readings, and consumers' billing, ledger posting, and the recording of remittances. This procedure reduced to a minimum the friction that usually arises in rendering consumers' bills and recording their remittances.

The work which is performed by eleven persons in the consumers' gas accounts division of this public utility company is a most interesting demonstration of speed, accuracy, and cooperation. The results produced by the operators are briefly summarized as follows:

RESULTS

No. of bills prepared per hour (average)	270
No. of items per bill	9
No. of items per bill (machined automatically due to machine being equipped with automatic date locking device)	2
No. of Ledger debit postings per hour (average)	365
No. of items per debit ledger posting	5
No. of items per debit ledger posting (machined automatically due to machine being equipped with automatic date locking device)	1
No. of Ledger credit postings per hour (average)	165

No. of items per credit ledger posting 2
No. of items per credit ledger posting (machined automatically due to machine being equipped with automatic date locking device) 1

Organization

Personnel: The department is organized as follows:
Supervisor
Eight machine operators
Comptometer operator
Ledger boy

Office hours:
9.00 to 12.00 A.M. and 1.00 to 5.00 P.M. daily
9.00 to 12.00 A.M. Saturday. All holidays are observed.

Incentives

In addition to a weekly salary paid to machine operators and other personnel, the following bonuses are paid:

Billing Operation: Machine operators are required to produce 140 bills per hour, and are paid a bonus of $.003 per bill for each bill written over 140 established as quota.

Ledger Posting Operation:

Debits—Operators are required to post 190 entries per hour, over which they are paid a bonus as follows:
Consumption items: $.002 per posting.
Merchandise items: $.005 per posting.

Credits—Operators are required to post 100 entries per hour over which they are paid the following rates:
Cash postings: $.004 per posting.
Merchandise: $.002 per posting.

In the event that an operator does not meet the quota, such shortages are deducted from overages, i.e., if bills are ahead and postings behind, the posting shortage is subtracted from points earned through the billing operation. The schedule of penalties shown in Figure 104 is adopted under the foregoing routine.

MACHINE OPERATORS PENALTY SCHEDULE

BILLS		LEDGER POSTING		CASH POSTING		TICKETS	
KIND OF ERROR	PENALTY	KIND OF ERROR	PENALTY	KIND OF ERROR	PENALTY	KIND OF ERROR	PENALTY
WRONG PRESENT INDEX	05 CENTS	WRONG PRESENT INDEX	05 CENTS	POSTED IN WRONG MONTH	25 CENTS	WRONG PRESENT INDEX	05 CENTS
" PREVIOUS "	05 "	" PREVIOUS "	25 "	" TO " ACCOUNT	50 "	" PREVIOUS "	05 "
" " DATE	05 "	" PRESENT DATE	05 "	NOT POSTED	25 "	" " DATE	05 "
" PRESENT	05 "	" EXTENSION	10 "	INCORRECT DATE USED	10 "	" PRESENT DATE	05 "
" DATE - ALL BILLS	50 "	POSTED WRONG MONTH	15 "	" TAPE DISTRIB'N	25 "	" EXTENSION	10 "
" EXTENSION	10 "	ALL DATES WRONG	50 "	AMOUNT POSTED	25 "	DATES NOT COMPLETE	05 "
DATES NOT COMPLETE	05 "	NO POSTING FOR READING	10 "	NO PAYMENT DATE	05 "	NO BILL PREPARED	10 "
NO BILL PREPARED	10 "	CROSSED WITH	25 "	INCORRECT COUNT OF POSTINGS	05 "	CROSSED WITH	25 "
CROSSED WITH	25 "	INCORRECT COUNT OF POSTINGS	05 "				
NO HOUSE NO. ON TAB	05 "						
INCORRECT COUNT OF BILLS	05 "						

Figure 104. Machine Operator's Penalty Schedule

Systems Employed by Department Stores.—Many excellent incentive plans have been developed to meet the needs of operative accounting routine production conditions in other lines of business, particularly department stores, that are worthy of mention as a comparison with those plans just described.

Observable experience has proved to the authors that a good machine operator in a well-conducted department store should handle an average of 500 tickets a day (under the unit plan of accounts receivable) and produce accurate results. Five hundred tickets a day would mean that such an operator should handle approximately 12,000 tickets a month. If the average wage paid such an operator is $18 a week or $78 a month, the approximate cost a hundred for posting tickets, on this basis, would be 65 cents.

Suppose, then, this operator knows that her wages will be $18 a week, or $78 a month, and that in order to hold her position she is expected to handle a minimum of 12,000 tickets a month. Let us offer this operator the further inducement that she will be paid at the rate of 50 cents a hundred for all tickets in excess of the 12,000 quota, but in order to insure accuracy the operator's bonus account will be charged with 25 tickets for each mistake she makes.

If this operator handles 15,000 charge tickets in a month, she will have 3,000 extra tickets to her credit. However, if she had made five mistakes, which would be charged as 25 tickets per mistake, and would mean that 125 tickets would be deducted from the 3,000, leaving 2,875 tickets on which a bonus at the rate of 50 cents a hundred, or $14.37 would be paid. One can see from this plan that the operator is paid for doing more work and is penalized for the mistakes she makes, so that as a matter of fact, the bonus is paid on increased output of good work. Of course, if the operator is not a high-class operator and is not capable of doing 12,000

tickets a month, she might be given a smaller quota of tickets per month with a smaller fixed salary.

The rates above are only approximate as wages vary in different localities. An operator in one city might be employed to handle 12,000 tickets a month for $18 a week, while in some other section it might be necessary to pay $22 per week. The proper way to figure out a bonus plan is to find out how many tickets the operators are averaging and what pay they are getting; then the rate per hundred or per thousand tickets should be ascertained, and a plan can be developed on that basis which takes into account local conditions which must, with fairness to employee and employer, always be considered.

One of the greatest difficulties found in firms starting on the bonus plan of paying their operators, is that some employers expect the bonus plan to cut down the wage of the operator, or that they will pay the operator a lower rate for doing more work. That is why so many bonus plans fail. A bonus plan worthy of the name means more pay to the operator who produces more results and if anything, the percentage of operator's wage should be slightly increased for increased production of better work, because increasing the efficiency of individual employees always results in general economy of operation.

In many instances operators are paid a salary which may increase with length of service. In a certain store the standard quota for each operator is 2,000 tickets per week regardless of salary. For every 100 over this amount the operators are paid a bonus of 25 cents, this bonus being payable monthly. Under this plan of payment, operators have the privilege of going home when their work is done. If an operator finishes all her postings and no one else is behind with work on which she can help out, she is at liberty to go home.

Another store pays on the basis of 10,833 tickets per month. All the ledgers are stuffed for the operators. After the operator reaches the quota, she receives a bonus of one

cent for each ticket posted, and is penalized 25 tickets for each error, which amount is taken out of her bonus. All items such as cash, returns, change of address, journal entries, etc., are counted as one ticket, and bringing forward balances is credited at one-half cent each.

Another store has a method of paying a bonus to operators upon the basis of 6,000 tickets per month per operator. Operators are responsible for everything including stuffing and watching all accounts, etc. The basis of the bonus is as follows:

60 cents per 100 for 6,000 to 7,000 tickets
70 cents per 100 for 7,000 to 8,000 tickets
80 cents per 100 for 8,000 or over
50 tickets are deducted from the records of operators for each error which causes trouble (only deductible from bonus)

This plan works very satisfactorily, but it does not permit of the same volume of work as under the plan next mentioned.

Some stores use as a basis 400 tickets per day per operator, and the operators are paid varying salaries according to agreement, and raised from time to time on account of length of service. The operators under this plan do their own stuffing. They are paid 50 cents for 100 tickets over the month's quota of tickets, and are charged 50 tickets for each error which causes trouble.

Another store, in the effort to encourage accurate work, pays a bonus of 1/10 of 1% of the amount outstanding on the ledger worked upon by the operator, who has no control over the size of the balances as all remittances must be reflected in the accounts. This store has a very clean set of books and is thoroughly satisfied. This bonus is paid to the operator providing she balances without trouble.

Under another plan a straight salary is paid, with an additional bonus of $1.00 per hundred tickets over 400 per day,

figured on a monthly basis. To encourage accurate work no deductions are made for errors, but the operator making the

MACHINE OPERATOR'S BLUNDER SLIP

DATE_____

AUDITOR OF RECEIPTS:-

I HEREBY ACKNOWLEDGE THAT THE FOLLOWING ERRORS WERE MADE BY_____ THIS DAY.

	NATURE OF ERROR	NO. OF ERRORS
1	OMITTED OR WRONG DATE	
2	WRONG OR NO NAME	
3	OMITTED OR WRONG INITIAL	
4	WRONG OR NO ADDRESS	
5	OMITTED APARTMENT OR NEAR WHICH STREET	
6	OMITTED OR WRONG CHECK NUMBER - SALES & CREDITS	
7	OMITTED OR WRONG DEPARTMENT NUMBER	
8	WRONG QUANTITY OR DESCRIPTION	
9	WRONG AMOUNT OF CHARGE	
10	WRONG AMOUNT OF CREDIT	
11	WRONG OLD BALANCE	
12	ERASURES	

CONTROL SUPERVISOR_____ MACHINE OPERATOR_____

Figure 105. Machine Operator's Blunder Slip

error must sign a blunder slip (Figure 105), which has a remarkable psychological effect.

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